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ABSTRACT

A databased approach to vocational course assessment enables users to rank the quality of vocational education courses. Courses ranked highest may be commended. Courses ranked lowest may be considered in need of improvement efforts. The Databased Course Assessment Method (DCAM) was developed in the public domain and customized to the needs of the Cleveland City School District. The approach is designed to minimize the influence of implicit judgments and perceptions. The DCAM structure consists of three interrelated components: the information selection framework, the scoring process, and the ranking process. Forty-one courses were selected for the pilot test of the DCAM. A group of employers, school administrators, and vocational administrators was convened to pilot test a procedure for obtaining DCAM information components and performance measure weights. One limitation in the application of the statistical procedures using pilot-test data is that these data were incomplete. Two conclusions can be drawn from the statistical analyses: (1) the DCAM approach can be statistically validated; and (2) the DCAM works optimally with stakeholder involvement. The data lend empirical support for stakeholders' involvement and show the relative contribution of the model's information components and performance measures. (Twenty-two exhibits are included. Appendix A contains the information set used in the pilot test. Appendix B contains the revised information set.) (NLA)

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The Databased Course Assessment Method (DCAM)

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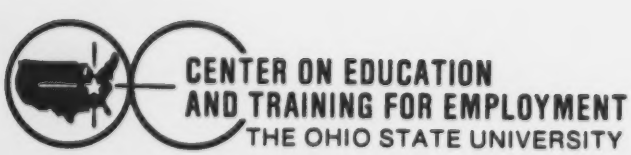

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THE DATABASED COURSE ASSESSMENT METHOD (DCAM)

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with

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FOREWORD

There continues to be a compelling need for database approaches to planning new vocational education courses and assessing ongoing ones to decide which of them are most in need of program improvements. Dr. Harold Starr and the Center on Education and Training for Employment, the Ohio State University, received funding from the Cleveland City School District to develop needed course assessment and planning methods that could be installed and implemented by the district's Division of Vocational and Career Education.

This report describes a database approach to vocational course assessment. The method enables users to rank the quality of vocational education courses. Courses ranked highest may be commended. Courses ranked lowest may be considered most in need of improvement efforts.

Dr. Harold Starr directed efforts to develop the database course assessment method and customize it for use by the Cleveland Public Schools. He is the major author of this report. Dr. Starr is a Senior Research Specialist Emeritus, the Ohio State University and is a consultant to education agencies.

Dr. Gary Grossman carried out the statistical analyses of pilot-test data and wrote the findings and conclusions of the analyses found in Chapter III of this report. He is a Research Specialist at the Center on Education and Training for Employment, the Ohio State University.

The authors express their thanks and appreciation to staff of the school district's Division of Vocational and Career Education including Casmira DiScipio (director), Steve Maiorca, John Perrin, and Richard Gore. These persons reviewed, contributed substantively, and critiqued components of the DCAM. Mr. Maiorca served as project monitor for the division and also did an outstanding job of collecting and organizing the pilot-test data. Thanks is also due Ann Holland who is on the staff of the district's Research and Analysis Department for her review and critique of the information set used in the pilot-test.

Harold Starr

CHAPTER I

INTRODUCTION

The Federal District Court issued an order requiring the Cleveland City School District to improve the quality of job preparation (vocational) courses. The school system responded to the court by identifying a number of course improvement initiatives and initiating efforts leading to their implementation.

One of the course improvement initiatives included implementing a more effective way to assess ongoing vocational courses and to plan for new courses. To this end, the district intends to implement a databased course assessment method that can be used to identify vocational courses most in need of improvements. It also intends to have available the kinds of information and data that are needed to plan for vocational education courses that will benefit both students and local employers.

Local school administrators currently use many kinds of data for vocational course assessment and planning purposes. However, these data lack the kind of structure and customizing that are needed to compare vocational courses to determine which ones are most in need of improvements and to plan new courses.

Staff within the district's Division of Vocational and Career Education conducted efforts to locate tested databased vocational course assessment methods. None were found. A Request for Proposal to design and pilot-test a databased course assessment method and formulate needed course planning data was then prepared by the school district and sent to prospective bidders. The school district selected The Center for Education and Training for Employment, the Ohio State University and Dr. Harold Starr to conduct a scope of work to achieve these objectives.

The present report describes the development and pilot-test of the databased course assessment method (DCAM). Data useful for planning new vocational courses is found in a separate report. The latter report includes

information and data obtained from documents describing local labor market conditions and needs and from a synthesis of interviews conducted with local business and labor persons.

Contents Of This Report

This report contains two chapters besides the current one. Chapter II, *The Databased Course Assessment Method (DCAM)*, consists of three sections. The first section includes a brief discussion of the common and unique characteristics of the DCAM. The second section describes the structure of the DCAM. The third section lists tasks local users may find helpful as they customize, install, and operate the DCAM. Chapter III, *The Pilot-Test of the DCAM*, includes a summary of the developmental activities leading to the pilot-test of the DCAM. It also includes a description of activities and outcomes of the pilot-test.

A number of exhibits and appendixes are found in the text of the present report. These materials are intended to help the reader better understand the DCAM and the steps required to customize, install and operate it.

CHAPTER II

THE DATABASED COURSE ASSESSMENT METHOD (DCAM)

Background

Vocational course assessment methods are mainly qualitative in nature. They rely mainly on expert judgments, observations, and intuition by vocational educators and other stakeholders (e.g., employers, parents) to produce reliable and valid assessment outcomes.

It is sometimes difficult to interpret the outcomes of qualitatively based course assessment methods. It is not unusual to find evaluators differing in their findings. Reasons for differences may include the fact that evaluators may look at different course behaviors and attributes or look at the same behaviors and attributes differently.

An alternative to qualitative course assessment was formulated by the author of this report. It was designed as a databased course assessment method (DCAM). One of the intentions of the design of the DCAM was to minimize the influence of implicit judgements and perceptions that are a part of qualitative assessment methods.[1]

Federal vocational education legislation since 1963 has promoted the application of the best data available for reporting and accountability purposes. Many state and local vocational education agencies have responded by developing more sophisticated management information systems. The presence of these systems was recognized in the conceptual development of the DCAM.

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[1]The remainder of this section draws heavily on material contained in *Harold Starr. Increasing Vocational Education Program Relevance: A Databased Approach.* Columbus: The National Center for Research In Vocational Education, The Ohio State University, 1987.

The (DCAM) is a conceptual product. It is the product of research and development efforts carried out by the National Center for Research in Vocational Education (now the Center for Education and Training for Employment), The Ohio State University.[2-5] To date, the DCAM has not been fully tested and installed in any school system.

Funding for the research and development described in the publications listed below came from three public sources. Funding for publications one, three, and five came from the U. S. Department of Education. Funding for publication two came from the Office of Instructional Programs, Georgia Department of Education. Funding for publication four came from the Vocational and Industrial Training Board, the Republic of Singapore.

The DCAM as a conceptual product was developed mainly in the public domain. The purpose of the present project is to customize it to the needs of the Cleveland City School District.

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[2]*Harold Starr.* **The Evaluation Index.** Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1988.

[3]*Harold Starr.* **Increasing Vocational Education Program Relevance: A Databased Approach.** Columbus: The National Center for Research In Vocational Education, The Ohio State University, 1987.

[4]*Harold Starr.* **The Development of a Practical Model for Planning Vocational Training.** In Management Information System for Vocational Education and Training--Final Report (ASEAN-Australian Development Education Project--Educational Management Information System). Singapore, Republic of Singapore: The Vocational and Industrial Training Board, 1984.

[5]*Harold Starr, Harold. Merz, and Gale. Zahniser.* **Using Labor Market Information for Vocational Planning.** Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1982.

Characteristics Of The DCAM

Among the characteristics that distinguish the present assessment method, the DCAM, from traditional ones are the following:

- The DCAM is databased.
- Comparisons of dissimilar course performances are made possible by a data-normalizing technique.
- The relative contribution (i.e., the relative weight) of different kinds of course behaviors or attributes in the assessment process can be obtained by having stakeholders value them or by using statistical procedures.
- The DCAM enables users to make comparisons between the same or different kinds of vocational courses. For example, users can compare all or a subset of ongoing vocational courses, the same vocational courses offered at different locations, or vocational courses within or between career clusters.
- Use of a microcomputer with spreadsheet software may enhance the speed of establishing rankings of courses for overall performance outcomes.

Two additional features of the DCAM are worth noting. First, school administrators will be able to conduct "desk-top audits" of DCAM outcomes to decide which vocational courses should be given priority attention as candidates for program improvements and which ones should be commended. Second, the DCAM complements rather than replaces traditional methods of assessing vocational education courses (e.g., PRIDE, supervisory judgments).

The DCAM Structure

The DCAM structure consists of three interrelated components: (1) the Information Selection Framework, (2) the Scoring Process, and (3) the Ranking Process. These three components are described next.

THE INFORMATION SELECTION FRAMEWORK

Users of the DCAM will need to find out what specific quantifiable performance information to include for course assessment. The Information Selection Framework provides a handy way to help DCAM users to achieve this task. The Information Selection Framework consists of five related elements. These elements are as follows:

- Information components
- Information categories
- Performance indicators
- Performance measures
- Performance measure outcomes and scores

The four elements are described below.

Information Components

Vocational educators typically are concerned with five kinds of information when assessing vocational education courses. These five kinds of information are as follows:

1. Input/Context

   The input/context component includes information about student demographics and employment conditions that are likely to effect course performance or the relevance of vocational offerings to employment needs of students and employers.

2. Instructional Processes

   The instructional processes component includes information about instructional and support practices and conditions that are likely to influence course outputs, outcomes, or benefits.

3. Student Outputs

   The student outputs component includes information about the extent to which students complete a designated grade or course of instruction.

4. Vocational Course Outcomes

   The vocational course outcomes component includes information about skill levels and educational achievements of course completers and their success in finding employment and pursuing further education.

5 Vocational Course Benefits

   The vocational course benefits component includes information about the economic and social benefits accruing to the individual, the economy, and to society when students get vocational instruction (e.g., wages, taxes paid locally)

Information Categories

The information components element of the Information Selection Framework serve as an organizing scheme for formulating specific categories of information. For example, if *instructional processes* is chosen as an information component, then course popularity and course costs may serve as information categories under instructional processes. Exhibit 1 lists information categories used in the pilot-test of the DCAM in the Cleveland City School District.

Exhibit 1 -- List Of Information Categories By Information Component

CONTEXT/INPUT COMPONENT

- Enrollment Equity
- Course Popularity

PROCESSES COMPONENT

- Course Costs
- Private Sector Support
- Secondary-Postsecondary Articulation
- Professional Development Experiences
- Instructional Design
- Student Organization Participation

OUTPUTS COMPONENT

- Course Attrition/Completion

OUTCOMES COMPONENT

- Job/education Status of Completers
- Professional Recognition of Completers

BENEFITS COMPONENT

- Wages of Completers

Performance Indicators

One or more performance indicators (performance criteria) need to be formulated for each information category in the Information Selection Framework. If *course popularity* is chosen as a performance category, then *the extent that students enroll in a vocational course of their choice* could serve as a performance indicator. Exhibit 2 lists performance indicators used in the pilot-test of the DCAM in the Cleveland City School District.

Performance Measures

One or more performance measures must be formulated for each performance indicator. For example, if *the extent that students enroll in a vocational course of their choice* serves as a performance indicator, *the percent of first-year students in a vocational course selecting it as their first choice* might serve as a performance measure. Exhibit 3 lists performance measures used in the pilot-test of the DCAM in the Cleveland City School District.

Performance Measure Outcomes And Scores

Lastly, a set of performance measure outcomes and scores is formulated for each performance measure. Outcome measures take the form of numbers, ratios, trends, discriminating values, or ranks.

The following might be a set of performance measure outcome statements for the performance measure *the percent of first-year students in a vocational course selecting it as their first choice:*

This course is among the three with the greatest percent of first-year students selecting it as their first choice.

This course ranks above the median for the percent of first-year students selecting it as their first choice.

This course ranks at or below the median for the percent of first-year students selecting it as their first choice.

This course is among the three with the smallest percent of first-year students selecting it as their first choice.

Performance data are not available.

Exhibit 2 -- List Of Performance Indicators[1]

CONTEXT/INPUT COMPONENT

- Enrollment Equity

  The extent that there is equity in enrollment of Black students in vocational courses

  The extent of sex equity in enrollments in vocational courses

- Course Popularity

  The extent that students enroll in a vocational course of their choice

  The extent that vocational courses make use of training capacity

  The extent that first-year vocational students return to the same course for a second year of instruction

PROCESSES COMPONENT

- Course Costs

  Costs associated with operating vocational courses

- Private Sector Support

  The extent that private sector sources contribute to the operations of vocational courses

  The extent of female and minority participation on vocational course advisory committees

- Secondary-Postsecondary Articulation

  The extent of secondary and postsecondary articulation

- Professional Development Experiences

  The extent that instructors participate in professional development experiences

- Instructional Design

  The extent that vocational education course curricula are competency-based according to state department of education standards

- Student Organization Participation

  The extent of participation by students in vocational education student organizations

OUTPUTS COMPONENT

- Course Attrition/Completion

  The extent of student attrition from vocational education courses

  The extent that students complete their vocational instruction

OUTCOMES COMPONENT

- Job/education Status of Completers

  The extent of training-related job placement assistance to vocational course completers

  The extent that vocational course completers succeed in finding jobs or furthering their education

- o Professional Recognition

  The extent that vocational course completers get licensing or certification (when applicable)

BENEFITS COMPONENT

- o Wages of Completers

  Entry-level wages of vocational course completers

[1]Performance Indicators are in italics

Exhibit 3 -- List Of Performance Measures[1]

CONTEXT/INPUT COMPONENT

Enrollment Equity

The extent that there is equity in enrollment of Black students in vocational courses

The percent deviation from the district's goal of 70 percent for Black first-year opening enrollment in each course

The extent of sex equity in enrollments in vocational courses

The percent deviation from the goal of 50 percent female for first-year opening enrollment in each courses

Course Popularity

The extent that students enroll in a vocational course of their choice

The percent of first-year students in a vocational course selecting it as their first choice

The extent that vocational courses make use of training capacity

The percent of first-year opening vocational course enrollment to first-year course capacity

The extent that first-year vocational students return to the same course for a second year of instruction

The percent of first-year vocational students who return to the same course for a second year of instruction

PROCESSES COMPONENT

Course Costs

Costs associated with operating vocational courses

The per-student operating costs for vocational courses

The per-completer operating costs for vocational courses

Private Sector Support

The extent that private sector sources contribute to the operations of vocational courses

The presence of tangible support this year and last year by private sector sources

The extent of female and minority participation on vocational course advisory committees

The number of persons from each sex and the number of minority persons represented on vocational course advisory committees

Secondary-Postsecondary Articulation

The extent of secondary and postsecondary articulation

A secondary-postsecondary articulation agreement is in force or is in the works

Professional Development Experiences

The extent that instructors participate in professional development experiences

Whether vocational instructors participated in professional development experiences this year and last year

Instructional Design

The extent that vocational education course curricula are competency-based according to state department of education standards

Competency-based vocational curriculum is in force or is in the works

The extent that vocational courses use computer software for skill enhancement or remedial education purposes

The number of years that vocational courses use computer software for skill enhancement and remedial education

Student Organization Participation

The extent of participation by students in vocational education student organizations

The percent of students in each vocational course participating in a vocational student organization

OUTPUTS COMPONENT

Course Attrition/Completion

The extent of student attrition from vocational education courses

The percent of students dropping out from vocational courses

The extent that students complete their vocational instruction

The percent of course completers to first-year course capacity

OUTCOMES COMPONENT

Job/education Status of Completers

The extent of training-related job placement assistance to vocational course completers

The percent of completers placed in training-related jobs with help from school staff

The extent that vocational course completers succeed in finding jobs or furthering their education

The percent of vocational course completers currently in training-related jobs, in the military, or pursuing further education

Professional Recognition

The extent that vocational course completers get licensing or certification (when applicable)

The percent of vocational course completers who get licensed or certified

BENEFITS COMPONENT

Wages of Completers

Entry-level wages of vocational course completers

The median entry-level wages earned by vocational course completers getting training-related jobs

[1]Performance Measures are in italics

The way in which normalized performance measure outcome scores are assigned to performance measure outcome statements is described in the next section of this report.

There are no specific rules for establishing the best or optimum number of performance measures and performance measure outcome statements for performance indicators. It should be easier to identify appropriate and useable ones where an education agency has a well-developed management information system and when users gain experience in operating the DCAM. This experience can be of help in assessing the credibility and stability of various performance measures and performance measure outcomes.

Exhibit 4 depicts the relationship between an information component and category, a performance indicator, a performance measure, and performance measure outcomes.

THE SCORING PROCESS

Normalizing Performance Measure Outcomes

Each performance measure in the Information Selection Framework has a set of performance measure outcomes associated with it. In addition, the framework requires that each performance measure should have the same number of performance measure outcome statements. All of the performance measure outcome statements comprising a performance measure are then assigned a simple range of scores (e.g., one to four or one to five).

The performance measure outcome scores are considered normalized because a performance measure outcome score of five (or four or three, etc.) in one set of performance measure outcome statements is equivalent to a performance measure outcome score of five (or four or three, etc.) in any other set of performance measure outcome statements. Exhibit 5 contains two sets of performance measure outcome statements that are scored five, four, three, two, and one.

Exhibit 4 -- An Information Component, Category, Performance Indicator, Performance Measure, And Performance Measure Outcomes.

PROCESS COMPONENT

Information Category: *Course Costs*

Performance Indicator:

Costs associated with operating vocational courses

Performance Measure

The per-student operating costs for vocational courses [1]

Performance Measure Outcomes

This course ranks first in its career cluster for lowest per-student operating cost.

This course ranks above the median in its career cluster (but not first) for per-student operating cost.

This course ranks at or below the median in its career cluster (but not last) for per-student operating cost.

This course ranks last in its career cluster for highest per-student operating cost.

Performance data are not available.

[3]The calculation of per-student operating cost does not include state reimbursement.

Exhibit 5 -- Performance Measure Outcomes and Scores

Performance Measure Outcomes and Scores (were 5 is best performance)

[5] This course ranks first in its career cluster for lowest per-student operating cost.

[4] This course ranks above the median in its career cluster for per-student operating cost.

[3] This course ranks at or below the median in its career cluster for per-student operating cost.

[2] This course ranks last in its career cluster for highest per-student operating cost.

[1] Performance data are not available.

Performance Measure Outcomes and Scores (where 5 is best performance)

[5] This course is among the three with the greatest percent of first-year students selecting it as their first choice.

[4] This course ranks above the median for the percent of first-year students selecting it as their first choice.

[3] This course ranks at or below the median for the percent of first-year students selecting it as their first choice.

[2] This course is among the three with the smallest percent of first-year students selecting it as their first choice.

[1] Performance data are not available.

Two dissimilar kinds of data presented in exhibit 5 may be compared in the following way. If a vocational course *ranks at or below the median for the percent of first-year students selecting it as their first choice*. it gets a score of three. It also gets a score of three if it has a *per-student operating cost that is at or below the median in its career cluster*. The normalizing process makes the former performance measure outcome equal to the latter one even though they are substantively dissimilar.

Another example of using normalized scores is as follows. If course "A" ranks above the median for *the percent of first-year students selecting it as their first choice*.it receives a score of four. If course "A" has the lowest *per-student operating cost in its career cluster* it receives a score of five. Course "A" receives a total score of nine for its performance on these two measures. If Course "B" ranks at or below the median *for the percent of first-year students selecting it as their first choice*.it receives a score of three. If course "B" has the *highest per-student operating cost in its career cluster* it receives a score of two. Course "B" receives a total score of 5 points for its performance on these two measures. Therefore, course "A" performs more adequately than course "B".

Weighting Information Components And Performance Measures

Using Stakeholders To Obtain Weights

Persons involved in applying qualitative methods to assess vocational education courses often give more weight (i.e., value) to some kinds of information than to others. Course assessors also frequently value some kinds of performances measures more than others. It is also likely that this valuing or weighting differs among assessors. The valuing process is usually implicit in nature and its impact on course assessment is usually either not taken into consideration or is unknown.

The DCAM recognizes the existence of this phenomenon and has incorporated procedures to make the valuing process explicit and objective. A summary of the procedures for weighting information components and performance measures is as follows:

- The assessors or a group of stakeholders is selected and convened to weight information components.

- o A method is established to reconcile differences among assessors (i.e., reach a consensus) about what weights to assign to the information components.

- o Instructions are given that 100 points are to be divided among the information components. If there are five components and all information components are perceived as equal in importance (an unlikely scenario) than each of them receives twenty points. Otherwise, each component receives a different weight of importance but the total for all components must equal 100 points.

- o Stakeholders weigh each of the information components. The weights are shared with the group and the process of reaching consensus is put in place. What results are weights for information components that are explicit in nature.

Performance measures could be weighted by the assessors or stakeholders in three ways. First, the persons doing the weighting could decide that all performance measures within an information component will be judged as equal in importance. Here, the number of performance measures in each information component is divided into the weight for its information component. If *Instructional Processes* is assigned a weight of thirty-five points and it has five performance measures under it, each of them receives a weight of seven points.

Second, each performance measure within an information component may be assigned its own weight. In this case, the sum of the performance measure weights must equal the weight assigned to the information component. Assume that an information component received a weight of thirty-five points and their are five performance measures. Each of the five measures may be assigned a different weight but the total of the five weights must equal thirty-five points.

Third, the process of weighting information components is dropped. The entire set of performance measures are weighted and they must total 100 points.

A group of stakeholders was convened to decide on weights to be used in the pilot-test of the DCAM. The outcomes of the convening are described in Chapter III.

Using Statistical Procedures To Obtain Weights

Regression analysis techniques can also be used to establish weights of importance for information components and performance measures. The Request for Proposal stipulated that the contractor use regression analyses to arrive at weights. The regression analyses used to perform the weighting task and their outcomes are described in Chapter III.

THE RANKING PROCESS

Courses being assessed need to be ranked to determine which ones are most in need of improvements and which ones should be commended. This task can be accomplished efficiently by using a ranking matrix.

The ranking matrix may be generated manually or by using a computer spreadsheet program. Users may find it more efficient to use the latter. Floppy disks containing ranking matrixes used in the pilot-test of the DCAM in the Cleveland City School District have been supplied to the division.

Seven tasks should be carried out to produce a ranking matrix. These tasks are as follows:

- Information components and their associated performance measures are entered as labels in matrix columns (see exhibit 6).
- The names of the courses being assessed are entered as labels in the matrix rows (see exhibit 7).
- Weights of importance are assigned by stakeholders to the information components and the performance measures associated with them (see exhibit 8).
- Normalized performance measure outcome scores are entered in the cells corresponding to their course and performance measure intersects (see exhibit 9).

- The normalized outcome scores are recalculated to reflect the weight given to their performance measures (see exhibit 10).

- The weighted normalized scores within each matrix row are summed to obtain a total performance score for each vocational course (see exhibit 11).

- The vocational courses are then ranked using the performance score totals. The highest ranked courses are those to be commended. The lowest ranked courses become candidates for program improvements (see exhibit 12).

Exhibit 6 -- Information Components And Performance Measures

	Context					Processes								
Weight % Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L	M	N

Exhibit 7--List Of Courses In The Ranking Matrix

	Context					Processes								
Weight % Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L	M	N
COURSES														
ALPHA														
BETA														
GAMMA														
DELTA														

Output	Outcomes			Bnft	Total
O	P	Q	R	S	T

Output	Outcomes			Bnft	Total
O	P	Q	R	S	T

Exhibit 8 -- Weighted Information Components And Performance Measures

	Context/Input					Processes						
Weight %	20 20					25 25						
Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L
Wt Score	2.7	2.5	5.4	3.9	5.5	2.5	2.3	3.0	1.9	2.6	4.0	4.1

COURSES

ALPHA

BETA

GAMMA

DELTA

Exhibit 9 -- Normalized Performance Measure Outcome Scores

		Context/Input					Processes						
Weight %		20 20					25 25						
Prfm Msre		A	B	C	D	E	F	G	H	I	J	K	L
Wt Score		2.7	2.5	5.4	3.9	5.5	2.5	2.3	3	1.9	2.6	4	4.1
COURSES	Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L
ALPHA	Norm Score	3	4	0	3	3	4	4	3	2	1	3	1
BETA	Norm Score	3	3	0	4	1	1	1	4	4	2	3	1
GAMMA	Norm Score	4	3	0	4	1	2	2	4	3	3	4	1
DELTA	Norm Score	3	3	0	1	2	1	1	4	3	3	4	1

		Outputs		Outcomes			Benft	Total
		10		30			15	106
		~~10~~		~~30~~			~~15~~	~~100~~
M	N	O	P	Q	R	S	T	
2.1	2.4	4.3	5.7	10.2	12.9	6.9	15.0	~~99.9~~
								99.9

		Outputs		Outcomes			Benft	Total
		10		30			15	100
		~~10~~		~~30~~			~~15~~	~~100~~
M	N	O	P	Q	R	S	T	
2.1	2.4	4.3	5.7	10.2	12.9	6.9	15.0	~~99.9~~
								99.9

M	N	O	P	Q	R	S	T
1	4	3	2	0	2	0	1
1	4	2	4	0	4	0	0
0	4	1	2	0	2	0	4
0	4	1	1	0	4	0	0

33

Exhibit 10 -- Recalculated Performance Measure Outcome Scores

		Context/Input					Processes						
	Weight %	~~20~~ 20					~~25~~ 25						
	Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L
	Wt Score	2.7	2.5	5.4	3.9	5.5	2.5	2.3	3.0	1.9	2.6	4.0	4.1
COURSES	Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L
ALPHA	Norm Score	3.0	4.0	0.0	3.0	3.0	4.0	4.0	3.0	2.0	1.0	3.0	1.0
	NS x WS	8.1	10.0	0.0	11.7	16.5	10.0	9.2	9.0	3.8	2.6	12.0	4.1
BETA	Norm Score	3.0	3.0	0.0	4.0	1.0	1.0	1.0	4.0	4.0	2.0	3.0	1.0
	NS x WS	8.1	7.5	0.0	15.6	5.5	2.5	2.3	12.0	7.6	5.2	12.0	4.1
GAMMA	Norm Score	4.0	3.0	0.0	4.0	1.0	2.0	2.0	4.0	3.0	3.0	4.0	1.0
	NS x WS	10.8	7.5	0.0	15.6	5.5	5.0	4.6	12.0	5.7	7.8	16.0	4.1
DELTA	Norm Score	3.0	3.0	0.0	1.0	2.0	1.0	1.0	4.0	3.0	3.0	4.0	1.0
	NS x WS	8.1	7.5	0.0	3.9	11.0	2.5	2.3	12.0	5.7	7.8	16.0	4.1

Exhibit 11 -- Weighted Sums Of Scores In The Ranking Matrix

		Context/Input					Processes						
	Weight %	~~20~~ 20					~~25~~ 25						
	Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L
	Wt Score	2.7	2.5	5.4	3.9	5.5	2.5	2.3	3	1.9	2.6	4	4.1
COURSES	Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L
ALPHA	Norm Score	3.0	4.0	0.0	3.0	3.0	4.0	4.0	3.0	2.0	1.0	3.0	1.0
	NS x WS	8.1	10.0	0.0	11.7	16.5	10.0	9.2	9.0	3.8	2.6	12.0	4.1
BETA	Norm Score	3.0	3.0	0.0	4.0	1.0	1.0	1.0	4.0	4.0	2.0	3.0	1.0
	NS x WS	8.1	7.5	0.0	15.6	5.5	2.5	2.3	12.0	7.6	5.2	12.0	4.1
GAMMA	Norm Score	4.0	3.0	0.0	4.0	1.0	2.0	2.0	4.0	3.0	3.0	4.0	1.0
	NS x WS	10.8	7.5	0.0	15.6	5.5	5.0	4.6	12.0	5.7	7.8	16.0	4.1
DELTA	Norm Score	3.0	3.0	0.0	1.0	2.0	1.0	1.0	4.0	3.0	3.0	4.0	1.0
	NS x WS	8.1	7.5	0.0	3.9	11.0	2.5	2.3	12.0	5.7	7.8	16.0	4.1

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		Outputs		Outcomes			Benft	Total
		10		30			15	100
		10		30			15	100
M	N	O	P	Q	R	S	T	
2.1	2.4	4.3	5.7	10.2	12.9	6.9	15.0	99.9

99.9

M	N	O	P	Q	R	S	T
1.0	4.0	3.0	2.0	0.0	2.0	0.0	1.0
2.1	9.6	12.9	11.4	0.0	25.8	0.0	15.0
1.0	4.0	2.0	4.0	0.0	4.0	0.0	0.0
2.1	9.6	8.6	22.8	0.0	51.6	0.0	0.0
0.0	4.0	1.0	2.0	0.0	2.0	0.0	4.0
0.0	9.6	4.3	11.4	0.0	25.8	0.0	60.0
0.0	4.0	1.0	1.0	0.0	4.0	0.0	0.0
0.0	9.6	4.3	5.7	0.0	51.6	0.0	0.0

		Outputs		Outcomes			Benft	Total
		10		30			15	100
		10		30			15	100
M	N	O	P	Q	R	S	T	
2.1	2.4	4.3	5.7	10.2	12.9	6.9	15.0	99.9

99.9

M	N	O	P	Q	R	S	T	TOTAL
1.0	4.0	3.0	2.0	0.0	2.0	0.0	1.0	44.0
2.1	9.6	12.9	11.4	0.0	25.8	0.0	15.0	173.8
1.0	4.0	2.0	4.0	0.0	4.0	0.0	0.0	42.0
2.1	9.6	8.6	22.8	0.0	51.6	0.0	0.0	177.1
0.0	4.0	1.0	2.0	0.0	2.0	0.0	4.0	44.0
0.0	9.6	4.3	11.4	0.0	25.8	0.0	60.0	205.7
0.0	4.0	1.0	1.0	0.0	4.0	0.0	0.0	36.0
0.0	9.6	4.3	5.7	0.0	51.6	0.0	0.0	152.1

Exhibit 12 -- Ranking Courses

		Context/Input					Processes						
	Weight %	~~20~~ 20					~~25~~ 25						
	Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L
	Wt Score	2.7	2.5	5.4	3.9	5.5	2.5	2.3	3.0	1.9	2.6	4.0	4.1
COURSES	Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L
ALPHA	Norm Score	3.0	4.0	0.0	3.0	3.0	4.0	4.0	3.0	2.0	1.0	3.0	1.0
	NS x WS	8.1	10.0	0.0	11.7	16.5	10.0	9.2	9.0	3.8	2.6	12.0	4.1
BETA	Norm Score	3.0	3.0	0.0	4.0	1.0	1.0	1.0	4.0	4.0	2.0	3.0	1.0
	NS x WS	8.1	7.5	0.0	15.6	5.5	2.5	2.3	12.0	7.6	5.2	12.0	4.1
GAMMA	Norm Score	4.0	3.0	0.0	4.0	1.0	2.0	2.0	4.0	3.0	3.0	4.0	1.0
	NS x WS	10.8	7.5	0.0	15.6	5.5	5.0	4.6	12.0	5.7	7.8	16.0	4.1
DELTA	Norm Score	3.0	3.0	0.0	1.0	2.0	1.0	1.0	4.0	3.0	3.0	4.0	1.0
	NS x WS	8.1	7.5	0.0	3.9	11.0	2.5	2.3	12.0	5.7	7.8	16.0	4.1

		Outputs		Outcomes			Benft	Total
		10		30			15	100
		10		30			15	100
M	N	O	P	Q	R	S	T	
2.1	2.4	4.3	5.7	10.2	12.9	6.9	15.0	99.9
								99.9

M	N	O	P	Q	R	S	T	TOTAL
1.0	4.0	3.0	2.0	0.0	2.0	0.0	1.0	44.0
2.1	9.6	12.9	11.4	0.0	25.8	0.0	15.0	173.8
1.0	4.0	2.0	4.0	0.0	4.0	0.0	0.0	42.0
2.1	9.6	8.6	22.8	0.0	51.6	0.0	0.0	177.1
0.0	4.0	1.0	2.0	0.0	2.0	0.0	4.0	44.0
0.0	9.6	4.3	11.4	0.0	25.8	0.0	60.0	205.7
0.0	4.0	1.0	1.0	0.0	4.0	0.0	0.0	36.0
0.0	9.6	4.3	5.7	0.0	51.6	0.0	0.0	152.1

RANK	COURSE	SCORE
1	GAMMA	205.7
2	BETA	177.1
3	ALPHA	173.8
4	DELTA	152.1

Major Tasks To Install And Operate The DCAM

There are 14 major tasks to be performed when installing, operating, and recycling the DCAM. These major tasks are as follows:

THE INFORMATION FRAMEWORK

1 LIST INFORMATION COMPONENTS THAT WILL BE USED WITH THE DCAM.

2. SPECIFY INFORMATION CATEGORIES FOR EACH ASSESSMENT COMPONENT.

3. ASSIGN ONE OR MORE PERFORMANCE INDICATORS TO EACH INFORMATION CATEGORY.

4. SELECT ONE OR MORE PERFORMANCE MEASURES FOR EACH INFORMATION CATEGORY.

THE SCORING PROCESS

1. IDENTIFY THE SCORING PROCESS TO BE USED FOR NORMALIZING PERFORMANCE MEASURE OUTCOMES.

2. FORMULATE PERFORMANCE MEASURE OUTCOME STATEMENTS THAT ARE COMPATIBLE WITH THE NORMALIZING PROCEDURE.

THE RANKING PROCESS

1. CONSTRUCT A RANKING MATRIX.

   A. LIST COURSES BEING ASSESSED IN MATRIX ROWS.

   B. LIST INFORMATION COMPONENTS AND THEIR ASSOCIATED PERFORMANCE MEASURES IN MATRIX COLUMNS.

   C. USE COLUMN ROW INTERSECTS TO RECORD NORMALIZED PERFORMANCE MEASURE OUTCOME SCORES.

2. ASSIGN NORMALIZED PERFORMANCE MEASURE OUTCOME SCORES TO THEIR PROPER CELL (I.E., ROW AND COLUMN INTERSECT).

3. DETERMINE WEIGHTING PROCEDURE OPTION TO BE USED WITH THE DCAM.

   A. GO WITH STATISTICALLY WEIGHTED NORMALIZED SCORES.

   B. HAVE A GROUP OF STAKEHOLDERS WEIGHT INFORMATION CATEGORIES or PERFORMANCE MEASURES OR

   C. STATISTICALLY REWEIGH JUDGMENTALLY WEIGHTED INFORMATION COMPONENTS OR PERFORMANCE MEASURES.

4. RECALCULATE WEIGHTED PERFORMANCE MEASURE OUTCOME SCORES IF OPTION 3. B OR C IS ELECTED.

5. RANK COURSES.

   A. TOTAL THE RAW OR WEIGHTED (I.E. RECALCULATED) PERFORMANCE MEASURE OUTCOME SCORES IN THE MATRIX ROWS LABELED WITH THE NAMES OR OTHER IDENTIFIERS FOR THE COURSES BEING ASSESSED.

   B. ARRANGE TOTAL SCORES IN DESCENDING ORDER COURSES OBTAINING THE HIGHEST TOTAL SCORES ARE CONSIDERED AS PERFORMING BEST. COURSES WITH THE LOWEST SCORES ARE CONSIDERED AS PERFORMING LEAST WELL AND THUS WOULD BE CANDIDATES FOR FURTHER REVIEW AND IMPROVEMENT INITIATIVES.

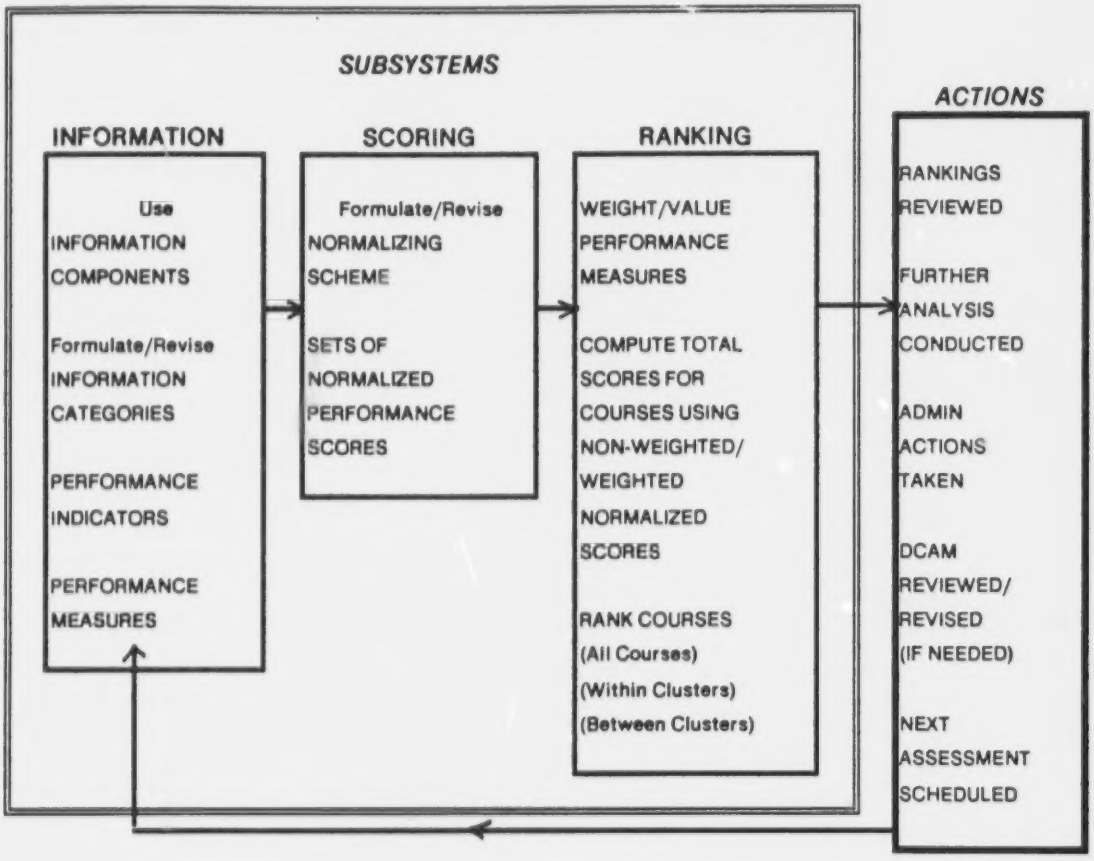
6. REPORT ASSESSMENT FINDINGS.

THE RECYCLING PROCESS

1. REEXAMINE THE DCAM COMPONENTS AND REVISE THEM AS DEEMED NECESSARY OR APPROPRIATE.

2. SELECT VOCATIONAL COURSES TO BE ASSESSED.AND CONDUCT THE DCAM.

The tasks required to install, operate, and recycle the DCAM can aslo be depicted in the following way:



CHAPTER III

THE PILOT TEST OF THE DCAM

Developmental Activities

SELECTION OF COURSES FOR THE PILOT-TEST

The Division of Vocational and Career Education was responsible for selecting courses to be included in the pilot-test of the DCAM. Forty-one courses were selected by the division.

THE INFORMATION SELECTION FRAMEWORK

Project staff formulated information categories for each of the framework's five information components. Then, performance indicators, measures and outcomes for each performance category were formulated. Project staff were aided in these tasks by examining the contents of the district's Request for Proposal which described many kinds of quantitative data about students and vocational courses that exist within the school district.

The results were sent to the school district's Division of Vocational and Career Education for review and comments. Project staff then met in Cleveland with division staff to obtain their reactions. Division staff suggestions were incorporated into a revised set of performance categories, indicators, measures, and outcomes.

The performance indicators in the revised set were sent out for review and comments to school district personnel employed outside the division. These persons were asked to suggest which performance indicators should remain or be deleted. They were also asked to suggest additional performance indicators that might be considered for use in the pilot-test. The responses were reviewed by project and division staff. The outcomes of the review were helpful in further revising performance categories, indicators, measures, and outcomes to be used with the DCAM adaptation being proposed to the division.

Several more iterations in the development of information categories and performance indicators, measures, and outcomes were carried out by project staff before the pilot-test of the DCAM. The information

components and categories and the performance indicators, measures, and outcomes used in the pilot-test are found in appendix A.

THE SCORING PROCESS

Selecting A Normalizing Procedure

Project and division staff agreed that it would be practical to use a five-point scale to normalize performance measure outcomes. A Score of four would indicate the most desirable level of performance. A scores of zero would indicate the absence of a performance measure outcome.

Weighting Information Components And Performance Measures

Judgmental and statistical procedures were used to assign weights of importance to information components and/or performance measures. Judgmental procedures used to weight information components and performance measures are described below. Statistical procedures were used to determine the most efficient and powerful combination of performance measures. The use of statistical procedures is described in the section labeled Pilot-Test Outcomes.

Judgmental Procedures

The division convened a group of employers, school administrators, and vocational instructors. The convening served two purposes. It served as a forum for orienting key persons about the DCAM. It also enabled division and project staff to pilot-test a procedure for obtaining information component and performance measure weights.

Project staff oriented the stakeholder group to the contracted scope of work with regard to the DCAM. Then the DCAM process was described. Lastly, the stakeholders' group was given instructions for weighting DCAM information components and performance measures.

The stakeholders were told that the weights to be elicited from them would be obtained by a process of group consensus. They were asked to rank the information components so that the five components totaled 100 points. The participants recorded their judgements on forms provided to them. Then, each stakeholder informed the group about the weight they assigned each component. The weights were recorded and displayed. It was evident that their was little consensus among the stakeholders.

Project staff selected persons who assigned the highest or lowest weights to an information component. These persons were asked to explain the reasons for the weights they assigned to the components. Stakeholders were encouraged to discuss the reasons why they felt particular information components were more important than others. They were then permitted to change the weights they initially assigned to each information component.

After re-recording everyone's weights for the information components, the group agreed to accept the median of the group's weights for each information component for use in the pilot-test. The median weights for the information components is found in exhibit 13.

The first set of performance measure weights did not require stakeholder involvement. Here, the number of performance measures within each information component was divided by the median weight assigned to the components by the stakeholders. The results of this weighting scheme are found in exhibit 14. In the exhibits that follow, performance measures are labeled as A through T. The performance measure statements A through T are found in Appendix A.

Next, stakeholders were asked to weigh performance measures within each information component. In this instance, the sum of the weights they assigned to the performance measures had to equal the weight assigned to the information component of which the measures were a part. The same process of group consensus that was used to weight information components was used to weight performance measures. The median weights obtained from the stakeholder group for the performance measures are found in exhibit 15.

Project staff believe that either of these two ways to get performance measure weights are acceptable. However, it can be argued that the latter procedure may more accurately reflect what stakeholders actually do during course assessment--even if they do so implicitly. If this assumption is correct, the procedure whereby stakeholders weigh performance measures within each information component may be the "best" or most sensitive one to use.

Lastly, stakeholders were asked to weight the entire group of performance measures so that the sum of the weights totaled 100 points. Here they were looking at performance measures independent of information components. This was the most difficult weighting task because of the number of performance measures to be weighted (i.e. twenty).

Exhibit 13--Information Component Weights

	Context/Input					Processes								
Weight %	20					25								
Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Wt Score														

Exhibit 14 -- Information Component And And Performance Measures Weights (Task 1)

	Context/Input					Processes								
Weight %	~~20~~ 20					~~25~~ 25								
Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Wt Score	4.0	4.0	4.0	4.0	4.0	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8

Exhibit 15 -- Information Component And And Performance Measure Weights (Task 2)

	Context/Input					Processes								
Weight %	~~20~~ 20					~~25~~ 25								
Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Wt Score	2.7	2.5	5.4	3.9	5.5	2.5	2.3	3.0	1.9	2.6	4.0	4.1	2.1	2.4

Outputs		Outcomes			Benft	Total
10		30			15	100
O	P	Q	R	S	T	

100

Outputs		Outcomes			Benft	Total
10		30			15	100
10		30			15	100
O	P	Q	R	S	T	
5.0	5.0	10.0	10.0	10.0	15.0	100.0

100.0

Outputs		Outcomes			Benft	Total
10		30			15	100
10		30			15	100
O	P	Q	R	S	T	
4.3	5.7	10.2	12.9	6.9	15.0	99.9

99.9

Again, the same process of group consensus that was used to weight information components was used to weight performance measures. Project staff felt that insufficient time was available for this weighting task to be carried out satisfactorily. Therefore, this procedure for weighting performance measures was not included as part of the pilot-test.

Pilot-Test Outcomes

COURSE RANKS

Performance measure outcomes data for use with the DCAM were collected by division staff and sent to project staff for review and analyses. Project staff entered normalized performance measure outcome scores for the 41 vocational courses included in the pilot-test into the appropriate cells of three ranking matrixes (see exhibits 16, 17, and 18).

Exhibit 16 depicts a completed ranking matrix that contains non-weighted normalized performance measure outcome scores Exhibit 17 depicts a completed ranking matrix that contains the information component and performance measure weights listed in exhibit 14. Exhibit 18 depicts a completed ranking matrix that contains the weighted information components and performance measures found in exhibit 15.

The sums of the non-weighted normalized performance measure outcome scores (exhibit 16) and the weighted normalized performance measure outcome scores (exhibits 17 and 18) for each of the 41 courses in the pilot-test were computed. Course ranks were obtained by placing the summed scores in descending order.

The three sets of course ranks that were produced were sent to division staff for review and comment. Project staff were informed that the DCAM pilot-test outcomes were generally consistent with staff judgements about which courses were performing best and which ones were most in need of a "get well" plan.

Exhibits 16, 17, and 18 do not contain course names. Courses are identified by number only. It would be insensitive to list course names for several reasons. First, the DCAM is being pilot-tested only. Second, data collection was incomplete. It was recognized at the onset of the pilot-test that the division would not be able to collect all of the data called for in the pilot-test.

Some performance measure outcomes used in the pilot-test were included even though it was known that data collection would be incomplete. However, division administrators anticipate that these data can be fully collected during the next school year. Ranks achieved by courses included in the pilot-test may change when revisions in the data set are made and data collection is complete.

A REVISED INFORMATION SET

Following the pilot-test, a revised information set (i.e., information categories, performance indicators, measures and outcomes) was produced. The revised information set is found in Appendix B. Prior to implementing the DCAM, division staff should review the revised set to determine that performance measure outcome data can be collected in a timely and reliable way.

USING STATISTICAL PROCEDURES WITH PILOT-TEST DATA

The purposes of using statistical procedures with DCAM data were as follows:

- To define the extent to which statistical techniques weighted the performance measures differently than judgements by a group of stakeholders

- To determine the most efficient and powerful combination of performance measures for predicting course "quality".

The outcomes that comprise each performance measure range in value from 0 to 4. They are all interpretable as interval level or above measures making them usable in correlation and regression designs.

Exhibit 19 displays a frequency distribution of performance measure outcome scores *where the performance measures are not weighted.* Some performance measures exhibit a near normal distribution of outcome scores (e.g., E and F while others are highly skewed (e.g., C). Other performance measures show a decided tendency toward bi-modality (e.g., A, C, and T) or approach near consensus (e.g., L).

Exhibit 16--A DCAM Ranking Matrix Using Raw Scores Only

		Context/Input					Processes								
CRS#	Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Norm Score	3	4	0	3	3	4	4	3	2	1	3	1	1	4
2	Norm Score	3	3	0	4	1	1	1	4	4	2	3	1	1	4
3	Norm Score	4	3	0	4	1	2	2	4	3	3	4	1	0	4
4	Norm Score	3	3	0	1	2	1	1	4	3	3	4	1	0	4
5	Norm Score	2	4	4	1	0	4	4	4	3	1	4	2	1	4
6	Norm Score	3	4	0	4	4	1	1	2	4	1	3	3	4	1
7	Norm Score	1	2	0	2	4	3	3	2	3	1	3	3	4	4
8	Norm Score	3	2	0	3	3	4	4	1	3	1	0	3	1	1
9	Norm Score	3	2	0	3	4	2	2	2	4	1	0	3	4	2
10	Norm Score	2	3	0	2	3	4	4	4	4	3	0	3	4	2
11	Norm Score	3	3	0	2	2	3	3	2	4	3	0	3	4	4
12	Norm Score	2	1	2	1	2	4	4	2	4	2	3	3	2	3
13	Norm Score	2	2	2	3	2	3	3	2	4	2	3	3	2	3
14	Norm Score	3	1	2	2	3	3	3	2	4	4	3	3	2	2
15	Norm Score	2	3	2	2	3	3	3	2	4	4	3	3	2	1
16	Norm Score	2	2	2	4	2	3	2	2	4	4	3	3	1	4
17	Norm Score	3	3	2	2	2	2	2	2	4	0	4	3	0	2
18	Norm Score	2	3	2	2	4	1	1	2	4	1	3	3	0	2
19	Norm Score	1	2	2	2	2	3	3	2	4	3	3	3	2	3
20	Norm Score	3	3	2	4	2	2	3	2	4	2	3	3	2	2
21	Norm Score	2	3	2	3	4	3	3	2	4	3	3	3	2	2

Outputs		Outcomes			Benft	
O	P	Q	R	S*	T	TOTAL
3	2	0	2	0	1	44
2	4	0	4	0	0	42
1	2	0	2	0	4	44
1	1	0	4	0	0	36
4	4	0	1	0	2	49
3	4	0	2	0	1	45
2	1	0	2	0	3	43
4	3	0	4	0	4	44
3	2	0	3	0	4	44
3	3	0	4	0	3	51
3	3	0	3	0	1	46
2	1	2	3	0	0	43
2	3	2	2	0	2	47
3	2	2	4	2	0	48
3	1	2	1	2	0	44
2	3	2	2	0	2	49
2	2	2	1	0	1	39
3	3	2	4	0	0	42
2	2	2	2	0	0	43
2	3	2	4	0	3	51
3	4	2	2	0	0	50

22	Norm Score	3	3	2	3	4	3	3	2	4	2	3	3	2	2
23	Norm Score	4	3	0	2	2	1	1	2	0	4	3	3	4	2
24	Norm Score	4	3	0	2	1	2	2	2	3	2	3	3	1	2
25	Norm Score	3	3	0	4	4	2	3	2	3	2	3	3	1	3
26	Norm Score	2	2	0	3	3	2	2	2	1	2	3	3	1	3
27	Norm Score	3	1	0	3	2	2	2	2	0	0	3	3	2	1
28	Norm Score	2	2	0	4	2	4	4	2	2	0	3	3	2	0
29	Norm Score	1	1	0	2	3	3	3	2	0	2	2	3	2	1
30	Norm Score	3	3	0	2	3	3	3	2	3	1	3	3	2	1
31	Norm Score	3	1	0	2	1	3	3	2	2	0	0	3	2	1
32	Norm Score	3	3	0	4	2	2	2	2	2	0	3	3	2	1
33	Norm Score	2	3	0	3	3	3	3	2	2	0	3	3	2	1
34	Norm Score	3	3	0	1	3	3	3	2	2	2	3	3	2	1
35	Norm Score	4	0	0	4	2	3	3	2	3	2	0	3	2	1
36	Norm Score	3	2	0	4	3	3	3	2	2	0	3	3	1	1
37	Norm Score	2	3	0	2	3	2	3	2	3	2	3	3	2	3
38	Norm Score	3	2	0	4	4	2	2	2	3	2	3	3	2	1
39	Norm Score	4	1	0	4	2	3	2	4	4	0	3	3	0	1
40	Norm Score	2	2	0	4	1	1	1	4	2	0	4	3	2	1
41	Norm Score	3	2	0	4	1	2	2	4	2	0	3	3	2	1

*This sum does not include the score for performance measure S. Use S only when comparing courses whose completers are eligible for certification and licensing.

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4	4	2	3	0	3	55
2	2	0	1	0	0	36
1	3	0	4	0	3	41
4	4	0	4	0	3	51
2	2	0	2	1	4	39
2	2	0	2	2	2	32
2	4	0	2	0	1	39
3	3	0	4	0	0	35
3	2	0	4	0	2	43
4	3	0	1	0	3	34
2	1	0	2	0	0	34
3	2	0	2	0	0	37
3	1	0	4	0	0	39
2	1	0	1	0	1	34
2	2	0	3	0	3	40
2	4	0	3	0	3	45
4	2	0	1	0	3	43
4	2	0	1	0	4	42
1	2	0	3	0	0	33
1	3	0	3	0	3	39

RANK ORDER--RAW SCORES

RANK	COURSE #	SCORE
1	21	55
2	10	51
3	20	51
4	25	51
5	22	50
6	5	49
7	16	49
8	14	48
9	13	47
10	11	46
11	6	45
12	37	45
13	15	44
14	1	44
15	3	44
16	8	44
17	9	44
18	7	43
19	12	43
20	19	43
21	30	43
22	38	43
23	2	42
24	18	42
25	39	42
26	24	41
27	36	40
28	26	39
29	17	39
30	28	39
31	34	39
32	41	39
33	33	37
34	4	36
35	23	36
36	29	35
37	31	34
38	32	34
39	35	34
40	40	33
41	27	32

Exhibit 17 -- A DCAM Ranking Matrix (Stakeholders' Task 1)

	Context					Process								
Weight %	20					28								
Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Wt Score	4.0	4.0	4.0	4.0	4.0	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L	M	N
CRS#														
1 Norm Score	3.0	4.0	0.0	3.0	3.0	4.0	4.0	3.0	2.0	1.0	3.0	1.0	1.0	4.0
NS x WS	12.0	16.0	0.0	12.0	12.0	11.1	11.1	8.3	5.6	2.8	8.3	2.8	2.8	11.1
2 Norm Score	3.0	3.0	0.0	4.0	1.0	1.0	1.0	4.0	4.0	2.0	3.0	1.0	1.0	4.0
NS x WS	12.0	12.0	0.0	16.0	4.0	2.8	2.8	11.1	11.1	5.6	8.3	2.8	2.8	11.1
3 Norm Score	4.0	3.0	0.0	4.0	1.0	2.0	2.0	4.0	3.0	3.0	4.0	1.0	0.0	4.0
NS x WS	16.0	12.0	0.0	16.0	4.0	5.6	5.6	11.1	8.3	8.3	11.1	2.8	0.0	11.1
4 Norm Score	3.0	3.0	0.0	1.0	2.0	1.0	1.0	4.0	3.0	3.0	4.0	1.0	0.0	4.0
NS x WS	12.0	12.0	0.0	4.0	8.0	2.8	2.8	11.1	8.3	8.3	11.1	2.8	0.0	11.1
5 Norm Score	2.0	4.0	4.0	1.0	0.0	4.0	4.0	4.0	3.0	1.0	4.0	2.0	1.0	4.0
NS x WS	8.0	16.0	16.0	4.0	0.0	11.1	11.1	11.1	8.3	2.8	11.1	5.6	2.8	11.1
6 Norm Score	3.0	4.0	0.0	4.0	4.0	1.0	1.0	2.0	4.0	1.0	3.0	3.0	4.0	1.0
NS x WS	12.0	16.0	0.0	16.0	16.0	2.8	2.8	5.6	11.1	2.8	8.3	8.3	11.1	2.8
7 Norm Score	1.0	2.0	0.0	2.0	4.0	3.0	3.0	2.0	3.0	1.0	3.0	3.0	4.0	4.0
NS x WS	4.0	8.0	0.0	8.0	16.0	8.3	8.3	5.6	8.3	2.8	8.3	8.3	11.1	11.1
8 Norm Score	3.0	2.0	0.0	3.0	3.0	4.0	4.0	1.0	3.0	1.0	0.0	3.0	1.0	1.0
NS x WS	12.0	8.0	0.0	12.0	12.0	11.1	11.1	2.8	8.3	2.8	0.0	8.3	2.8	2.8
9 Norm Score	3.0	2.0	0.0	3.0	4.0	2.0	2.0	2.0	4.0	1.0	0.0	3.0	4.0	2.0
NS x WS	12.0	8.0	0.0	12.0	16.0	5.6	5.6	5.6	11.1	2.8	0.0	8.3	11.1	5.6
10 Norm Score	2.0	3.0	0.0	2.0	3.0	4.0	4.0	4.0	4.0	3.0	0.0	3.0	4.0	2.0
NS x WS	8.0	12.0	0.0	8.0	12.0	11.1	11.1	11.1	11.1	8.3	0.0	8.3	11.1	5.6
11 Norm Score	3.0	3.0	0.0	2.0	2.0	3.0	3.0	2.0	4.0	3.0	0.0	3.0	4.0	4.0
NS x WS	12.0	12.0	0.0	8.0	8.0	8.3	8.3	5.6	11.1	8.3	0.0	8.3	11.1	11.1
12 Norm Score	2.0	1.0	2.0	1.0	2.0	4.0	4.0	2.0	4.0	2.0	3.0	3.0	2.0	3.0
NS x WS	8.0	4.0	8.0	4.0	8.0	11.1	11.1	5.6	11.1	5.6	8.3	8.3	5.6	8.3
13 Norm Score	2.0	2.0	2.0	3.0	2.0	3.0	3.0	2.0	4.0	2.0	3.0	3.0	2.0	3.0
NS x WS	8.0	8.0	8.0	12.0	8.0	8.3	8.3	5.6	11.1	5.6	8.3	8.3	5.6	8.3

Outpt		Outcms			Benft	Total
10		30			15	100
O	P	Q	R	S*	T	
5.0	5.0	10.0	10.0	10.0	15.0	100.0

O	P	Q	R	S	T	TOTAL
3.0	2.0	0.0	2.0	0.0	1.0	44.0
15.0	10.0	0.0	20.0	0.0	15.0	175.9
2.0	4.0	0.0	4.0	0.0	0.0	42.0
10.0	20.0	0.0	40.0	0.0	0.0	172.3
1.0	2.0	0.0	2.0	0.0	4.0	44.0
5.0	10.0	0.0	20.0	0.0	60.0	206.9
1.0	1.0	0.0	4.0	0.0	0.0	36.0
5.0	5.0	0.0	40.0	0.0	0.0	144.3
4.0	4.0	0.0	1.0	0.0	2.0	49.0
20.0	20.0	0.0	10.0	0.0	30.0	199.0
3.0	4.0	0.0	2.0	0.0	1.0	45.0
15.0	20.0	0.0	20.0	0.0	15.0	185.6
2.0	1.0	0.0	2.0	0.0	3.0	43.0
10.0	5.0	0.0	20.0	0.0	45.0	188.2
4.0	3.0	0.0	4.0	0.0	4.0	44.0
20.0	15.0	0.0	40.0	0.0	60.0	229.0
3.0	2.0	0.0	3.0	0.0	4.0	44.0
15.0	10.0	0.0	30.0	0.0	60.0	218.6
3.0	3.0	0.0	4.0	0.0	3.0	51.0
15.0	15.0	0.0	40.0	0.0	45.0	232.8
3.0	3.0	0.0	3.0	0.0	1.0	46.0
15.0	15.0	0.0	30.0	0.0	15.0	187.2
2.0	1.0	2.0	3.0	0.0	0.0	43.0
10.0	5.0	20.0	30.0	0.0	0.0	172.0
2.0	3.0	2.0	2.0	0.0	2.0	47.0
10.0	15.0	20.0	20.0	0.0	30.0	208.4

14 Norm Score	3.0	1.0	2.0	2.0	3.0	3.0	3.0	2.0	4.0	4.0	3.0	3.0	2.0	2.0
NS x WS	12.0	4.0	8.0	8.0	12.0	8.3	8.3	5.6	11.1	11.1	8.3	8.3	5.6	5.6
15 Norm Score	2.0	3.0	2.0	2.0	3.0	3.0	3.0	2.0	4.0	4.0	3.0	3.0	2.0	1.0
NS x WS	8.0	12.0	8.0	8.0	12.0	8.3	8.3	5.6	11.1	11.1	8.3	8.3	5.6	2.8
16 Norm Score	2.0	2.0	2.0	4.0	2.0	3.0	2.0	2.0	4.0	4.0	3.0	3.0	1.0	4.0
NS x WS	8.0	8.0	8.0	16.0	8.0	8.3	5.6	5.6	11.1	11.1	8.3	8.3	2.8	11.1
17 Norm Score	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	0.0	4.0	3.0	0.0	2.0
NS x WS	12.0	12.0	8.0	8.0	8.0	5.6	5.6	5.6	11.1	0.0	11.1	8.3	0.0	5.6
18 Norm Score	2.0	3.0	2.0	2.0	4.0	1.0	1.0	2.0	4.0	1.0	3.0	3.0	0.0	2.0
NS x WS	8.0	12.0	8.0	8.0	16.0	2.8	2.8	5.6	11.1	2.8	8.3	8.3	0.0	5.6
19 Norm Score	1.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	4.0	3.0	3.0	3.0	2.0	3.0
NS x WS	4.0	8.0	8.0	8.0	8.0	8.3	8.3	5.6	11.1	8.3	8.3	8.3	5.6	8.3
20 Norm Score	3.0	3.0	2.0	4.0	2.0	2.0	3.0	2.0	4.0	2.0	3.0	3.0	2.0	2.0
NS x WS	12.0	12.0	8.0	16.0	8.0	5.6	8.3	5.6	11.1	5.6	8.3	8.3	5.6	5.6
21 Norm Score	2.0	3.0	2.0	3.0	4.0	3.0	3.0	2.0	4.0	3.0	3.0	3.0	2.0	2.0
NS x WS	8.0	12.0	8.0	12.0	16.0	8.3	8.3	5.6	11.1	8.3	8.3	8.3	5.6	5.6
22 Norm Score	3.0	3.0	2.0	3.0	4.0	3.0	3.0	2.0	4.0	2.0	3.0	3.0	2.0	2.0
NS x WS	12.0	12.0	8.0	12.0	16.0	8.3	8.3	5.6	11.1	5.6	8.3	8.3	5.6	5.6
23 Norm Score	4.0	3.0	0.0	2.0	2.0	1.0	1.0	2.0	0.0	4.0	3.0	3.0	4.0	2.0
NS x WS	16.0	12.0	0.0	8.0	8.0	2.8	2.8	5.6	0.0	11.1	8.3	8.3	11.1	5.6
24 Norm Score	4.0	3.0	0.0	2.0	1.0	2.0	2.0	2.0	3.0	2.0	3.0	3.0	1.0	2.0
NS x WS	16.0	12.0	0.0	8.0	4.0	5.6	5.6	5.6	8.3	5.6	8.3	8.3	2.8	5.6
25 Norm Score	3.0	3.0	0.0	4.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0	3.0	1.0	3.0
NS x WS	12.0	12.0	0.0	16.0	16.0	5.6	8.3	5.6	8.3	5.6	8.3	8.3	2.8	8.3
26 Norm Score	2.0	2.0	0.0	3.0	3.0	2.0	2.0	2.0	1.0	2.0	3.0	3.0	1.0	3.0
NS x WS	8.0	8.0	0.0	12.0	12.0	5.6	5.6	5.6	2.8	5.6	8.3	8.3	2.8	8.3
27 Norm Score	3.0	1.0	0.0	3.0	2.0	2.0	2.0	2.0	0.0	0.0	3.0	3.0	2.0	1.0
NS x WS	12.0	4.0	0.0	12.0	8.0	5.6	5.6	5.6	0.0	0.0	8.3	8.3	5.6	2.8
28 Norm Score	2.0	2.0	0.0	4.0	2.0	4.0	4.0	2.0	2.0	0.0	3.0	3.0	2.0	0.0
NS x WS	8.0	8.0	0.0	16.0	8.0	11.1	11.1	5.6	5.6	0.0	8.3	8.3	5.6	0.0
29 Norm Score	1.0	1.0	0.0	2.0	3.0	3.0	3.0	2.0	0.0	2.0	2.0	3.0	2.0	1.0
NS x WS	4.0	4.0	0.0	8.0	12.0	8.3	8.3	5.6	0.0	5.6	5.6	8.3	5.6	2.8
30 Norm Score	3.0	3.0	0.0	2.0	3.0	3.0	3.0	2.0	3.0	1.0	3.0	3.0	2.0	1.0
NS x WS	12.0	12.0	0.0	8.0	12.0	8.3	8.3	5.6	8.3	2.8	8.3	8.3	5.6	2.8

3.0	2.0	2.0	4.0	2.0	0.0	48.0
15.0	10.0	20.0	40.0	20.0	0.0	201.2
3.0	1.0	2.0	1.0	2.0	0.0	44.0
15.0	5.0	20.0	10.0	20.0	0.0	167.4
2.0	3.0	2.0	2.0	0.0	2.0	49.0
10.0	15.0	20.0	20.0	0.0	30.0	215.2
2.0	2.0	2.0	1.0	0.0	1.0	39.0
10.0	10.0	20.0	10.0	0.0	15.0	165.8
3.0	3.0	2.0	4.0	0.0	0.0	42.0
15.0	15.0	20.0	40.0	0.0	0.0	189.2
2.0	2.0	2.0	2.0	0.0	0.0	43.0
10.0	10.0	20.0	20.0	0.0	0.0	168.2
2.0	3.0	2.0	4.0	0.0	3.0	51.0
10.0	15.0	20.0	40.0	0.0	45.0	249.9
3.0	4.0	2.0	2.0	0.0	0.0	50.0
15.0	20.0	20.0	20.0	0.0	0.0	200.4
4.0	4.0	2.0	3.0	0.0	3.0	55.0
20.0	20.0	20.0	30.0	0.0	45.0	261.7
2.0	2.0	0.0	1.0	0.0	0.0	36.0
10.0	10.0	0.0	10.0	0.0	0.0	129.6
1.0	3.0	0.0	4.0	0.0	3.0	41.0
5.0	15.0	0.0	40.0	0.0	45.0	200.6
4.0	4.0	0.0	4.0	0.0	3.0	51.0
20.0	20.0	0.0	40.0	0.0	45.0	242.1
2.0	2.0	0.0	2.0	1.0	4.0	39.0
10.0	10.0	0.0	20.0	10.0	60.0	192.8
2.0	2.0	0.0	2.0	2.0	2.0	32.0
10.0	10.0	0.0	20.0	20.0	30.0	147.7
2.0	4.0	0.0	2.0	0.0	1.0	39.0
10.0	20.0	0.0	20.0	0.0	15.0	160.6
3.0	3.0	0.0	4.0	0.0	0.0	35.0
15.0	15.0	0.0	40.0	0.0	0.0	148.0
3.0	2.0	0.0	4.0	0.0	2.0	43.0
15.0	10.0	0.0	40.0	0.0	30.0	197.3

31 Norm Score	3.0	1.0	0.0	2.0	1.0	3.0	3.0	2.0	2.0	0.0	0.0	3.0	2.0	1.0
NS x WS	12.0	4.0	0.0	8.0	4.0	8.3	8.3	5.6	5.6	0.0	0.0	8.3	5.6	2.8
32 Norm Score	3.0	3.0	0.0	4.0	2.0	2.0	2.0	2.0	2.0	0.0	3.0	3.0	2.0	1.0
NS x WS	12.0	12.0	0.0	16.0	8.0	5.6	5.6	5.6	5.6	0.0	8.3	8.3	5.6	2.8
33 Norm Score	2.0	3.0	0.0	3.0	3.0	3.0	3.0	2.0	2.0	0.0	3.0	3.0	2.0	1.0
NS x WS	8.0	12.0	0.0	12.0	12.0	8.3	8.3	5.6	5.6	0.0	8.3	8.3	5.6	2.8
34 Norm Score	3.0	3.0	0.0	1.0	3.0	3.0	3.0	2.0	2.0	2.0	3.0	3.0	2.0	1.0
NS x WS	12.0	12.0	0.0	4.0	12.0	8.3	8.3	5.6	5.6	5.6	8.3	8.3	5.6	2.8
35 Norm Score	4.0	0.0	0.0	4.0	2.0	3.0	3.0	2.0	3.0	2.0	0.0	3.0	2.0	1.0
NS x WS	16.0	0.0	0.0	16.0	8.0	8.3	8.3	5.6	8.3	5.6	0.0	8.3	5.6	2.8
36 Norm Score	3.0	2.0	0.0	4.0	3.0	3.0	3.0	2.0	2.0	0.0	3.0	3.0	1.0	1.0
NS x WS	12.0	8.0	0.0	16.0	12.0	8.3	8.3	5.6	5.6	0.0	8.3	8.3	2.8	2.8
37 Norm Score	2.0	3.0	0.0	2.0	3.0	2.0	3.0	2.0	3.0	2.0	3.0	3.0	2.0	3.0
NS x WS	8.0	12.0	0.0	8.0	12.0	5.6	8.3	5.6	8.3	5.6	8.3	8.3	5.6	8.3
38 Norm Score	3.0	2.0	0.0	4.0	4.0	2.0	2.0	2.0	3.0	2.0	3.0	3.0	2.0	1.0
NS x WS	12.0	8.0	0.0	16.0	16.0	5.6	5.6	5.6	8.3	5.6	8.3	8.3	5.6	2.8
39 Norm Score	4.0	1.0	0.0	4.0	2.0	3.0	2.0	4.0	4.0	0.0	3.0	3.0	0.0	1.0
NS x WS	16.0	4.0	0.0	16.0	8.0	8.3	5.6	11.1	11.1	0.0	8.3	8.3	0.0	2.8
40 Norm Score	2.0	2.0	0.0	4.0	1.0	1.0	1.0	4.0	2.0	0.0	4.0	3.0	2.0	1.0
NS x WS	8.0	8.0	0.0	16.0	4.0	2.8	2.8	11.1	5.6	0.0	11.1	8.3	5.6	2.8
41 Norm Score	3.0	2.0	0.0	4.0	1.0	2.0	2.0	4.0	2.0	0.0	3.0	3.0	2.0	1.0
NS x WS	12.0	8.0	0.0	16.0	4.0	5.6	5.6	11.1	5.6	0.0	8.3	8.3	5.6	2.8

*This sum does not include the score for performance measure S. Use S only when comparing courses whose completers are eligible for certification and licensing.

4.0	3.0	0.0	1.0	0.0	3.0	34.0
20.0	15.0	0.0	10.0	0.0	45.0	162.4
2.0	1.0	0.0	2.0	0.0	0.0	34.0
10.0	5.0	0.0	20.0	0.0	0.0	130.2
3.0	2.0	0.0	2.0	0.0	0.0	37.0
15.0	10.0	0.0	20.0	0.0	0.0	141.8
3.0	1.0	0.0	4.0	0.0	0.0	39.0
15.0	5.0	0.0	40.0	0.0	0.0	158.3
2.0	1.0	0.0	1.0	0.0	1.0	34.0
10.0	5.0	0.0	10.0	0.0	15.0	132.8
2.0	2.0	0.0	3.0	0.0	3.0	40.0
10.0	10.0	0.0	30.0	0.0	45.0	193.0
2.0	4.0	0.0	3.0	0.0	3.0	45.0
10.0	20.0	0.0	30.0	0.0	45.0	208.9
4.0	2.0	0.0	1.0	0.0	3.0	43.0
20.0	10.0	0.0	10.0	0.0	45.0	192.6
4.0	2.0	0.0	1.0	0.0	4.0	42.0
20.0	10.0	0.0	10.0	0.0	60.0	199.6
1.0	2.0	0.0	3.0	0.0	0.0	33.0
5.0	10.0	0.0	30.0	0.0	0.0	131.0
1.0	3.0	0.0	3.0	0.0	3.0	39.0
5.0	15.0	0.0	0.0	0.0	45.0	157.8

RANK	COURSE NO.	SCORE
1	22	261.7
2	20	249.9
3	25	242.1
4	10	232.8
5	8	229.0
6	9	218.6
7	16	215.2
8	37	208.9
9	13	208.4
10	3	206.9
11	14	201.2
12	24	200.6
13	21	200.4
14	39	199.6
15	5	199.0
16	30	197.3
17	36	193.0
18	26	192.8
19	38	192.6
20	18	189.2
21	7	188.2
22	11	187.2
23	6	185.6
24	1	175.9
25	2	172.3
26	12	172.0
27	19	168.2
28	15	167.4
29	17	165.8
30	31	162.4
31	28	160.6
32	34	158.3
33	41	157.8
34	29	148.0
35	27	147.7
36	4	144.3
37	33	141.8
38	35	132.8
39	40	131.0
40	32	130.2
41	23	129.6

Exhibit 18 -- A DCAM Ranking Matrix (Stakeholders' Task 2)

		Context/Input					Processes								
	Weight %	20					35								
	Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	Wt Score	2.7	2.5	5.4	3.9	5.5	2.5	2.3	3.0	1.9	2.6	4.0	4.1	2.1	2.4
	Prfm Msre	A	B	C	D	E	F	G	H	I	J	K	L	M	N
CRS#															
1	Norm Score	3.0	4.0	0.0	3.0	3.0	4.0	4.0	3.0	2.0	1.0	3.0	1.0	1.0	4.0
	NS x WS	8.1	10.0	0.0	11.7	16.5	10.0	9.2	9.0	3.8	2.6	12.0	4.1	2.1	9.6
2	Norm Score	3.0	3.0	0.0	4.0	1.0	1.0	1.0	4.0	4.0	2.0	3.0	1.0	1.0	4.0
	NS x WS	8.1	7.5	0.0	15.6	5.5	2.5	2.3	12.0	7.6	5.2	12.0	4.1	2.1	9.6
3	Norm Score	4.0	3.0	0.0	4.0	1.0	2.0	2.0	4.0	3.0	3.0	4.0	1.0	0.0	4.0
	NS x WS	10.8	7.5	0.0	15.6	5.5	5.0	4.6	12.0	5.7	7.8	16.0	4.1	0.0	9.6
4	Norm Score	3.0	3.0	0.0	1.0	2.0	1.0	1.0	4.0	3.0	3.0	4.0	1.0	0.0	4.0
	NS x WS	8.1	7.5	0.0	3.9	11.0	2.5	2.3	12.0	5.7	7.8	16.0	4.1	0.0	9.6
5	Norm Score	2.0	4.0	4.0	1.0	0.0	4.0	4.0	4.0	3.0	1.0	4.0	2.0	1.0	4.0
	NS x WS	5.4	10.0	21.6	3.9	0.0	10.0	9.2	12.0	5.7	2.6	16.0	8.2	2.1	9.6
6	Norm Score	3.0	4.0	0.0	4.0	4.0	1.0	1.0	2.0	4.0	1.0	3.0	3.0	4.0	1.0
	NS x WS	8.1	10.0	0.0	15.6	22.0	2.5	2.3	6.0	7.6	2.6	12.0	12.3	8.4	2.4
7	Norm Score	1.0	2.0	0.0	2.0	4.0	3.0	3.0	2.0	3.0	1.0	3.0	3.0	4.0	4.0
	NS x WS	2.7	5.0	0.0	7.8	22.0	7.5	6.9	6.0	5.7	2.6	12.0	12.3	8.4	9.6
8	Norm Score	3.0	2.0	0.0	3.0	3.0	4.0	4.0	1.0	3.0	1.0	0.0	3.0	1.0	1.0
	NS x WS	8.1	5.0	0.0	11.7	16.5	10.0	9.2	3.0	5.7	2.6	0.0	12.3	2.1	2.4
9	Norm Score	3.0	2.0	0.0	3.0	4.0	2.0	2.0	2.0	4.0	1.0	0.0	3.0	4.0	2.0
	NS x WS	8.1	5.0	0.0	11.7	22.0	5.0	4.6	6.0	7.6	2.6	0.0	12.3	8.4	4.8
10	Norm Score	2.0	3.0	0.0	2.0	3.0	4.0	4.0	4.0	4.0	3.0	0.0	3.0	4.0	2.0
	NS x WS	5.4	7.5	0.0	7.8	16.5	10.0	9.2	12.0	7.6	7.8	0.0	12.3	8.4	4.8
11	Norm Score	3.0	3.0	0.0	2.0	2.0	3.0	3.0	2.0	4.0	3.0	0.0	3.0	4.0	4.0
	NS x WS	8.1	7.5	0.0	7.8	11.0	7.5	6.9	6.0	7.6	7.8	0.0	12.3	8.4	9.6
12	Norm Score	2.0	1.0	2.0	1.0	2.0	4.0	4.0	2.0	4.0	2.0	3.0	3.0	2.0	3.0
	NS x WS	5.4	2.5	10.8	3.9	11.0	10.0	9.2	6.0	7.6	5.2	12.0	12.3	4.2	7.2
13	Norm Score	2.0	2.0	2.0	3.0	2.0	3.0	3.0	2.0	4.0	2.0	3.0	3.0	2.0	3.0
	NS x WS	5.4	5.0	10.8	11.7	11.0	7.5	6.9	6.0	7.6	5.2	12.0	12.3	4.2	7.2

Outputs		Outcomes			Benft	Total
10		30			15	100
O	P	Q	R	S*	T	
4.3	5.7	10.2	12.9	6.9	15.0	99.9

O	P	Q	R	S	T	TOTAL
3.0	2.0	0.0	2.0	0.0	1.0	44.0
12.9	11.4	0.0	25.8	0.0	15.0	173.8
2.0	4.0	0.0	4.0	0.0	0.0	42.0
8.6	22.8	0.0	51.6	0.0	0.0	177.1
1.0	2.0	0.0	2.0	0.0	4.0	44.0
4.3	11.4	0.0	25.8	0.0	60.0	205.7
1.0	1.0	0.0	4.0	0.0	0.0	36.0
4.3	5.7	0.0	51.6	0.0	0.0	152.1
4.0	4.0	0.0	1.0	0.0	2.0	49.0
17.2	22.8	0.0	12.9	0.0	30.0	199.2
3.0	4.0	0.0	2.0	0.0	1.0	45.0
12.9	22.8	0.0	25.8	0.0	15.0	188.3
2.0	1.0	0.0	2.0	0.0	3.0	43.0
8.6	5.7	0.0	25.8	0.0	45.0	193.6
4.0	3.0	0.0	4.0	0.0	4.0	44.0
17.2	17.1	0.0	51.6	0.0	60.0	234.5
3.0	2.0	0.0	3.0	0.0	4.0	44.0
12.9	11.4	0.0	38.7	0.0	60.0	221.1
3.0	3.0	0.0	4.0	0.0	3.0	51.0
12.9	17.1	0.0	51.6	0.0	45.0	235.9
3.0	3.0	0.0	3.0	0.0	1.0	46.0
12.9	17.1	0.0	38.7	0.0	15.0	184.2
2.0	1.0	2.0	3.0	0.0	0.0	43.0
8.6	5.7	20.4	38.7	0.0	0.0	180.7
2.0	3.0	2.0	2.0	0.0	2.0	47.0
8.6	17.1	20.4	25.8	0.0	30.0	214.7

14	Norm Score	3.0	1.0	2.0	2.0	3.0	3.0	3.0	2.0	4.0	4.0	3.0	3.0	2.0	2.0
	NS x WS	8.1	2.5	10.8	7.8	16.5	7.5	6.9	6.0	7.6	10.4	12.0	12.3	4.2	4.8
15	Norm Score	2.0	3.0	2.0	2.0	3.0	3.0	3.0	2.0	4.0	4.0	3.0	3.0	2.0	1.0
	NS x WS	5.4	7.5	10.8	7.8	16.5	7.5	6.9	6.0	7.6	10.4	12.0	12.3	4.2	2.4
16	Norm Score	2.0	2.0	2.0	4.0	2.0	3.0	2.0	2.0	4.0	4.0	3.0	3.0	1.0	4.0
	NS x WS	5.4	5.0	10.8	15.6	11.0	7.5	4.6	6.0	7.6	10.4	12.0	12.3	2.1	9.6
17	Norm Score	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	0.0	4.0	3.0	0.0	2.0
	NS x WS	8.1	7.5	10.8	7.8	11.0	5.0	4.6	6.0	7.6	0.0	16.0	12.3	0.0	4.8
18	Norm Score	2.0	3.0	2.0	2.0	4.0	1.0	1.0	2.0	4.0	1.0	3.0	3.0	0.0	2.0
	NS x WS	5.4	7.5	10.8	7.8	22.0	2.5	2.3	6.0	7.6	2.6	12.0	12.3	0.0	4.8
19	Norm Score	1.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	4.0	3.0	3.0	3.0	2.0	3.0
	NS x WS	2.7	5.0	10.8	7.8	11.0	7.5	6.9	6.0	7.6	7.8	12.0	12.3	4.2	7.2
20	Norm Score	3.0	3.0	2.0	4.0	2.0	2.0	3.0	2.0	4.0	2.0	3.0	3.0	2.0	2.0
	NS x WS	8.1	7.5	10.8	15.6	11.0	5.0	6.9	6.0	7.6	5.2	12.0	12.3	4.2	4.8
21	Norm Score	2.0	3.0	2.0	3.0	4.0	3.0	3.0	2.0	4.0	3.0	3.0	3.0	2.0	2.0
	NS x WS	5.4	7.5	10.8	11.7	22.0	7.5	6.9	6.0	7.6	7.8	12.0	12.3	4.2	4.8
22	Norm Score	3.0	3.0	2.0	3.0	4.0	3.0	3.0	2.0	4.0	2.0	3.0	3.0	2.0	2.0
	NS x WS	8.1	7.5	10.8	11.7	22.0	7.5	6.9	6.0	7.6	5.2	12.0	12.3	4.2	4.8
23	Norm Score	4.0	3.0	0.0	2.0	2.0	1.0	1.0	2.0	0.0	4.0	3.0	3.0	4.0	2.0
	NS x WS	10.8	7.5	0.0	7.8	11.0	2.5	2.3	6.0	0.0	10.4	12.0	12.3	8.4	4.8
24	Norm Score	4.0	3.0	0.0	2.0	1.0	2.0	2.0	2.0	3.0	2.0	3.0	3.0	1.0	2.0
	NS x WS	10.8	7.5	0.0	7.8	5.5	5.0	4.6	6.0	5.7	5.2	12.0	12.3	2.1	4.8
25	Norm Score	3.0	3.0	0.0	4.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0	3.0	1.0	3.0
	NS x WS	8.1	7.5	0.0	15.6	22.0	5.0	6.9	6.0	5.7	5.2	12.0	12.3	2.1	7.2
26	Norm Score	2.0	2.0	0.0	3.0	3.0	2.0	2.0	2.0	1.0	2.0	3.0	3.0	1.0	3.0
	NS x WS	5.4	5.0	0.0	11.7	16.5	5.0	4.6	6.0	1.9	5.2	12.0	12.3	2.1	7.2
27	Norm Score	3.0	1.0	0.0	3.0	2.0	2.0	2.0	2.0	0.0	0.0	3.0	3.0	2.0	1.0
	NS x WS	8.1	2.5	0.0	11.7	11.0	5.0	4.6	6.0	0.0	0.0	12.0	12.3	4.2	2.4
28	Norm Score	2.0	2.0	0.0	4.0	2.0	4.0	4.0	2.0	2.0	0.0	3.0	3.0	2.0	0.0
	NS x WS	5.4	5.0	0.0	15.6	11.0	10.0	9.2	6.0	3.8	0.0	12.0	12.3	4.2	0.0
29	Norm Score	1.0	1.0	0.0	2.0	3.0	3.0	3.0	2.0	0.0	2.0	2.0	3.0	2.0	1.0
	NS x WS	2.7	2.5	0.0	7.8	16.5	7.5	6.9	6.0	0.0	5.2	8.0	12.3	4.2	2.4
30	Norm Score	3.0	3.0	0.0	2.0	3.0	3.0	3.0	2.0	3.0	1.0	3.0	3.0	2.0	1.0
	NS x WS	8.1	7.5	0.0	7.8	16.5	7.5	6.9	6.0	5.7	2.6	12.0	12.3	4.2	2.4

3.0	2.0	2.0	4.0	2.0	0.0	48.0
12.9	11.4	20.4	51.6	13.8	0.0	213.7
3.0	1.0	2.0	1.0	2.0	0.0	44.0
12.9	5.7	20.4	12.9	13.8	0.0	169.2
2.0	3.0	2.0	2.0	0.0	2.0	49.0
8.6	17.1	20.4	25.8	0.0	30.0	221.8
2.0	2.0	2.0	1.0	0.0	1.0	39.0
8.6	11.4	20.4	12.9	0.0	15.0	169.8
3.0	3.0	2.0	4.0	0.0	0.0	42.0
12.9	17.1	20.4	51.6	0.0	0.0	205.6
2.0	2.0	2.0	2.0	0.0	0.0	43.0
8.6	11.4	20.4	25.8	0.0	0.0	175.0
2.0	3.0	2.0	4.0	0.0	3.0	51.0
8.6	17.1	20.4	51.6	0.0	45.0	259.7
3.0	4.0	2.0	2.0	0.0	0.0	50.0
12.9	22.8	20.4	25.8	0.0	0.0	208.4
4.0	4.0	2.0	3.0	0.0	3.0	55.0
17.2	22.8	20.4	38.7	0.0	45.0	270.7
2.0	2.0	0.0	1.0	0.0	0.0	36.0
8.6	11.4	0.0	12.9	0.0	0.0	128.7
1.0	3.0	0.0	4.0	0.0	3.0	41.0
4.3	17.1	0.0	51.6	0.0	45.0	207.3
4.0	4.0	0.0	4.0	0.0	3.0	51.0
17.2	22.8	0.0	51.6	0.0	45.0	252.2
2.0	2.0	0.0	2.0	1.0	4.0	39.0
8.6	11.4	0.0	25.8	6.9	60.0	200.7
2.0	2.0	0.0	2.0	2.0	2.0	32.0
8.6	11.4	0.0	25.8	13.8	30.0	155.6
2.0	4.0	0.0	2.0	0.0	1.0	39.0
8.6	22.8	0.0	25.8	0.0	15.0	166.7
3.0	3.0	0.0	4.0	0.0	0.0	35.0
12.9	17.1	0.0	51.6	0.0	0.0	163.6
3.0	2.0	0.0	4.0	0.0	2.0	43.0
12.9	11.4	0.0	51.6	0.0	30.0	205.4

31	Norm Score	3.0	1.0	0.0	2.0	1.0	3.0	3.0	2.0	2.0	0.0	0.0	3.0	2.0	1.0
	NS x WS	8.1	2.5	0.0	7.8	5.5	7.5	6.9	6.0	3.8	0.0	0.0	12.3	4.2	2.4
32	Norm Score	3.0	3.0	0.0	4.0	2.0	2.0	2.0	2.0	2.0	0.0	3.0	3.0	2.0	1.0
	NS x WS	8.1	7.5	0.0	15.6	11.0	5.0	4.6	6.0	3.8	0.0	12.0	12.3	4.2	2.4
33	Norm Score	2.0	3.0	0.0	3.0	3.0	3.0	3.0	2.0	2.0	0.0	3.0	3.0	2.0	1.0
	NS x WS	5.4	7.5	0.0	11.7	16.5	7.5	6.9	6.0	3.8	0.0	12.0	12.3	4.2	2.4
34	Norm Score	3.0	3.0	0.0	1.0	3.0	3.0	3.0	2.0	2.0	2.0	3.0	3.0	2.0	1.0
	NS x WS	8.1	7.5	0.0	3.9	16.5	7.5	6.9	6.0	3.8	5.2	12.0	12.3	4.2	2.4
35	Norm Score	4.0	0.0	0.0	4.0	2.0	3.0	3.0	2.0	3.0	2.0	0.0	3.0	2.0	1.0
	NS x WS	10.8	0.0	0.0	15.6	11.0	7.5	6.9	6.0	5.7	5.2	0.0	12.3	4.2	2.4
36	Norm Score	3.0	2.0	0.0	4.0	3.0	3.0	3.0	2.0	2.0	0.0	3.0	3.0	1.0	1.0
	NS x WS	8.1	5.0	0.0	15.6	16.5	7.5	6.9	6.0	3.8	0.0	12.0	12.3	2.1	2.4
37	Norm Score	2.0	3.0	0.0	2.0	3.0	2.0	3.0	2.0	3.0	2.0	3.0	3.0	2.0	3.0
	NS x WS	5.4	7.5	0.0	7.8	16.5	5.0	6.9	6.0	5.7	5.2	12.0	12.3	4.2	7.2
38	Norm Score	3.0	2.0	0.0	4.0	4.0	2.0	2.0	2.0	3.0	2.0	3.0	3.0	2.0	1.0
	NS x WS	8.1	5.0	0.0	15.6	22.0	5.0	4.6	6.0	5.7	5.2	12.0	12.3	4.2	2.4
39	Norm Score	4.0	1.0	0.0	4.0	2.0	3.0	2.0	4.0	4.0	0.0	3.0	3.0	0.0	1.0
	NS x WS	10.8	2.5	0.0	15.6	11.0	7.5	4.6	12.0	7.6	0.0	12.0	12.3	0.0	2.4
40	Norm Score	2.0	2.0	0.0	4.0	1.0	1.0	1.0	4.0	2.0	0.0	4.0	3.0	2.0	1.0
	NS x WS	5.4	5.0	0.0	15.6	5.5	2.5	2.3	12.0	3.8	0.0	16.0	12.3	4.2	2.4
41	Norm Score	3.0	2.0	0.0	4.0	1.0	2.0	2.0	4.0	2.0	0.0	3.0	3.0	2.0	1.0
	NS x WS	8.1	5.0	0.0	15.6	5.5	5.0	4.6	12.0	3.8	0.0	12.0	12.3	4.2	2.4

*This sum does not include the score for performance measure S. Use S only when comparing courses whose completers are eligible for certification and licensing.

4.0	3.0	0.0	1.0	0.0	3.0	34.0
17.2	17.1	0.0	12.9	0.0	45.0	159.2
2.0	1.0	0.0	2.0	0.0	0.0	34.0
8.6	5.7	0.0	25.8	0.0	0.0	132.6
3.0	2.0	0.0	2.0	0.0	0.0	37.0
12.9	11.4	0.0	25.8	0.0	0.0	146.3
3.0	1.0	0.0	4.0	0.0	0.0	39.0
12.9	5.7	0.0	51.6	0.0	0.0	166.5
2.0	1.0	0.0	1.0	0.0	1.0	34.0
8.6	5.7	0.0	12.9	0.0	15.0	129.8
2.0	2.0	0.0	3.0	0.0	3.0	40.0
8.6	11.4	0.0	38.7	0.0	45.0	201.9
2.0	4.0	0.0	3.0	0.0	3.0	45.0
8.6	22.8	0.0	38.7	0.0	45.0	216.8
4.0	2.0	0.0	1.0	0.0	3.0	43.0
17.2	11.4	0.0	12.9	0.0	45.0	194.6
4.0	2.0	0.0	1.0	0.0	4.0	42.0
17.2	11.4	0.0	12.9	0.0	60.0	199.8
1.0	2.0	0.0	3.0	0.0	0.0	33.0
4.3	11.4	0.0	38.7	0.0	0.0	141.4
1.0	3.0	0.0	3.0	0.0	3.0	39.0
4.3	17.1	0.0	38.7	0.0	45.0	195.6

RANK	COURSE #	SCORE
1	22	270.7
2	20	259.7
3	25	252.2
4	10	235.9
5	8	234.5
6	16	221.8
7	9	221.1
8	37	216.8
9	13	214.7
10	14	213.7
11	21	208.4
12	24	207.3
13	3	205.7
14	18	205.6
15	30	205.4
16	36	201.9
17	26	200.7
18	39	199.8
19	5	199.2
20	41	195.6
21	38	194.6
22	7	193.6
23	6	188.3
24	11	184.2
25	12	180.7
26	2	177.1
27	19	175.0
28	1	173.8
29	17	169.8
30	15	169.2
31	28	166.7
32	34	166.5
33	29	163.6
34	31	159.2
35	27	155.6
36	4	152.1
38	40	141.4
39	32	132.6
40	35	129.8
41	23	128.7

Exhibit 19 -- Frequency Distribution of Performance Measure Outcome Scores

Perf Meas	Scores	N	%
A	0	0	0.0
	1	3	7.3
	2	13	31.7
	3	20	48.8
	4	5	12.2
	MEAN =	2.7	
	S.D. =	0.8	

Perf Meas	Scores	N	%
B	0	1	2.4
	1	6	14.6
	2	12	29.3
	3	9	22.0
	4	3	7.3
	MEAN =	2.4	
	S.D. =	0.9	

Perf Meas	Scores	N	%
C	0	29	70.7
	1	0	0.0
	2	11	26.8
	3	0	0.0
	4	1	2.4
	MEAN =	0.6	
	S.D. =	1.0	

Perf Meas	Scores	N	%
D	0	0	0.0
	1	4	9.8
	2	14	34.1
	3	9	22.0
	4	14	34.1
	MEAN =	2.8	
	S.D. =	1.0	

Perf Meas	Scores	N	%
E	0	1	2.4
	1	6	14.6
	2	14	34.1
	3	12	29.3
	4	8	19.5
	MEAN =	2.5	
	S.D. =	1.0	

Perf Meas	Scores	N	%
F	0	0	0.0
	1	6	14.6
	2	12	29.3
	3	17	41.5
	4	6	14.6
	MEAN =	2.6	
	S.D. =	0.9	

Perf Meas	Scores	N	%
G	0	0	0.0
	1	6	14.6
	2	11	26.8
	3	18	43.9
	4	6	14.6
	MEAN =	2.6	
	S.D. =	0.9	

Perf Meas	Scores	N	%
H	0	0	0.0
	1	1	2.4
	2	31	75.6
	3	1	2.4
	4	8	19.5
	MEAN =	2.4	
	S.D. =	0.8	

Perf Meas	Scores	N	%
I	0	3	7.3
	1	1	2.4
	2	9	22.0
	3	11	26.8
	4	17	41.5
	MEAN =	2.9	
	S.D. =	1.2	

Perf Meas	Scores	N	%
J	0	10	24.4
	1	8	19.5
	2	13	31.7
	3	6	14.6
	4	4	9.8
	MEAN =	1.7	
	S.D. =	1.3	

Perf Meas	Scores	N	%
K	0	6	14.6
	1	0	0.0
	2	1	2.4
	3	29	70.7
	4	5	12.2
	MEAN =	2.7	
	S.D. =	1.2	

Perf Meas	Scores	N	%
L	0	0	0.0
	1	4	9.8
	2	1	2.4
	3	36	87.8
	4	0	0.0
	MEAN =	2.1	
	S.D. =	1.2	

Perf Meas	Scores	N	%
M	0	5	12.2
	1	9	22.0
	2	21	51.2
	3	0	0.0
	4	6	14.6
	MEAN =	1.8	
	S.D. =	1.1	

Perf Meas	Scores	N	%
N	0	1	2.4
	1	16	39.0
	2	10	24.4
	3	6	14.6
	4	8	19.5
	MEAN =	2.1	
	S.D. =	1.2	

Perf Meas	Scores	N	%
O	0	0	0.0
	1	5	12.2
	2	16	39.0
	3	13	31.7
	4	7	17.1
	MEAN =	2.5	
	S.D. =	0.9	

Perf Meas	Scores	N	%
P	0	0	0.0
	1	7	17.1
	2	15	36.6
	3	11	26.8
	4	8	19.5
	MEAN =	2.5	
	S.D. =	1.0	

Perf Meas	Scores	N	%
Q	0	30	73.2
	1	0	0.0
	2	11	26.8
	3	0	0.0
	4	0	0.0
	MEAN =	0.5	
	S.D. =	0.9	

Perf Meas	Scores	N	%
R	0	0	0.0
	1	8	19.5
	2	13	31.7
	3	8	19.5
	4	12	29.3
	MEAN =	2.6	
	S.D. =	1.1	

Perf Meas	Scores	N	%
T	0	14	34.1
	1	6	14.6
	2	5	12.2
	3	11	26.8
	4	5	12.2
	MEAN =	1.7	
	S.D. =	1.5	

Some notion of those performance measures which discriminate most between courses can be inferred because of the construction of the item response structure. Given no weighting criteria and the fact that course "quality" is determined by a simple additive scale, key determinants of course quality would be a function of those performance measures that tend to be regarded as most important. The higher the value of the mean, therefore, the greater its contribution to "quality".

The frequency data suggest that those performance measures with the highest means would be the "most important". Hence, since performance measures A, D, F, G, I, K, and R are the performance measures with means above 2.5, one can conclude that these measures alone could be used to determine course quality and the balance of the performance measures could be disregarded.

To do this, would, however, undermine much of the value of the DCAM and would violate some of the fundamental assumptions of the behavior of variables in combination with one another. First, the DCAM process is designed to incorporate performance measures collectively for their combined contribution to "quality". Secondly, a frequency distribution is hardly the most effective means of identifying the mutual effects of variables on a dependent variable--in this case, performance measures on total performance measure score (TS).

At the request of the sponsor, multiple linear regression was used to determine the most efficient and powerful combination of performance measures for predicting course "quality". Performance measures were entered as independent variables into a stepwise design with total performance measure scores being used as the dependent variable (see exhibit 16).

Multiple linear regression was applied three times in order to satisfy the purposes of using statistical procedures. Exhibit 20 summarizes the results of multiple regression analysis where performance measures are not weighted and performance measure outcome scores range from 0 to 4 (see exhibit 20). Insofar as the critical feature of the design is relational strength, the absolute values of correlates will be reported for clarity.

In each instance, the data show the sequence of performance measures entering into the regression equation, an assessment of their strength of contribution upon entry, and their strength in the final summary. In accordance with the rules of stepwise regression, those performance measures whose level of statistical

significance was less than p=.05 were deleted from further consideration. Nine of the nineteen performance measures included in the analysis contributed significantly to the dependent variable. These are reported in exhibit 20.

Multiple Regression Where Performance Measures Are Not Weighted

The output from using multiple linear regression reveals that not all performance measures are of equal value in predicting course quality. Only about half of the performance measures were needed to "explain" 93.4 percent of the variance in the dependent variable. Thus, it can be fairly stated that the application of the DCAM using non-weighted performance measure outcome scores did a good job in accounting for differences in quality among courses.

Another piece of information provided by the data concerns the relative value of variables within the equation. It will be noted that the sequence of variables entering into the regression equation were a function of their relative strength as partials. In other words, the magnitude of their coefficients outside of the regression equation determined their entry. Yet, one advantage of a regression design is that this strength is modified upon the entry of other variables, either strengthening it in the case of an interaction effect or weakening it as a function of the latter factor explaining the variance better. Therefore, exhibit 20 shows some differences in the Beta values in terms of the entry of other variables. We discover, then, that performance measures G, T, and I are ultimately the most important performance measures with regard to predicting total score (i.e., course "quality").

These findings have several meanings. It could mean that course cost per completer, entry-level wages paid to course completers obtaining training related jobs, and gender and racial balance on course advisory committees are the most important individual performance measures in determining course quality. Alternatively, it may simply mean that process measures in general are the more important factors along with the wages that completers can command in training related jobs. Certainly, some cogent explanation could be developed for why these particular performance measures emerge. Yet, no such explanation seems obvious. Thus, it could be that these measures emerged purely as an artifact of the conditions of analysis (i.e., that every performance measure is treated equally.) Because we have stakeholder data o this point, subsequent analyses may clarify the situation for us.

Multiple Regression--Stakeholders Task 1

Exhibit 21 summarizes the results of multiple regression analysis where information components were weighted by a group of stakeholders as described in a preceding section and performance measures are weighted as a fraction of the weight assigned to their component. (see exhibit 17). The recalculated performance measure outcome scores were then obtained by multiplying the performance measure weight by the raw outcome score associated with the measure.

This regression analysis shows several similarities with the preceding one. First, the strength of the equation is also very high, even somewhat enhanced. This, in part, is an artifact of the composition of the dependent variable. However, it is useful to show that a subset of variables are the primary ones in explaining the variance in Total Score in contrast to the use of the entire list. Additionally, one of the crucial variables in the equation is the same--the entry level wages earned by course completers obtaining training-related employment.

Whatever the similarities, the differences may be more important here. Performance measure T as an independent variable is much stronger in this equation. Further, one notes that performance measure R, the extent to which course completers are working in training-related jobs, are in the military, or are pursuing further education, plays an important role here while not even making an entry in the first analysis (see exhibit 20). Indeed, the logic of variables T and R performing key roles in determining course quality makes a good deal better intuitive sense as differentiating measures thus sparing us from the somewhat stretched logic the previous analysis offered. Additionally, the stronger variables in this equation seem to complement one another conceptually in contrast to what we saw where performance measures were not weighted.

Finally, considerably more variables enter the equation itself. This fact suggests that the differential weighting of their information components changed the analysis in other ways as well. By inspection, the somewhat lesser contribution of process variables and the greater role of context, output, and outcome variables suggests an overall improvement in the interpretability, hence, usability,of the model. This point can be explored in view of the third analysis.

Multiple Regression--Stakeholders Task 2

Exhibit 22 summarizes the results of multiple regression analysis where performance measures were differentially weighted by the stakeholders and the sum of the differential weighting equalled the weight assigned to their information component (see exhibit 18). Again, recalculated performance measure outcome scores were then obtained by multiplying the performance measure weight by the raw outcome score associated with the measure.

The data in exhibit 22 show some many of the same tendencies exhibited in the preceding analysis--albeit somewhat stronger. All five information components influence quality to some extent. Benefit, outcome, and output variables emerge earliest and generally more strongly. Benefit and outcome measures are the most influential in defining course quality and this finding is intuitively sensible. It can be argued that better course outcomes and benefits depend on effective educational processes and context conditions as the DCAM model predicts. This sustaining of the overall DCAM approach is perhaps the most important finding that results from this type of statistical analysis.

Limitations On The Findings and Conclusions

One limitation in the application of the statistical procedures using pilot-test data is that these data were unavoidably incomplete. With this limitation in mind, two conclusions can be drawn from the statistical analyses presented above. First, the DCAM approach can be statistically validated as it has been in this review. Second, the DCAM generally works as it is proposed and it works optimally with stakeholder involvement. The data lend empirical support for the involvement of stakeholders as well as showing the relative contribution of information components and performance measures within the model.

Exhibit 20 -- Stepwise Multiple Regresssion
(Non-Weighted Performance Measures)

Component	Measure	b	Beta	p	R2 (on entry)
Constant					
Process	I	1.76	.281	.000	.463
Output	P	1.53	.273	.000	.609
Process	J	1.41	.224	.000	.690
Process	G	1.64	.331	.000	.770
Benefit	T	1.19	.317	.000	.818
Context	B	1.02	.167	.005	.865
Context	E	1.16	.218	.000	.892
Process	K	0.67	.140	.032	.923
Context	C	1.52	.153	.034	.934

Exhibit 21 -- Stepwise Multiple Regresssion
(Stakeholders' Task 1)

Component	Measure	b	Beta	p	R2 (on entry)
Constant					
Benefit	T	1.04	.696	.000	.404
Process	I	1.29	.127	.000	.670
Outcome	R	0.94	.334	.000	.777
Context	C	1.46	.182	.000	.862
Context	E	0.92	.115	.001	.906
Output	P	0.91	.173	.000	.942
Process	J	1.49	.158	.000	.959
Context	B	1.48	.163	.000	.964
Context	D	1.02	.126	.001	.971
Process	F	1.36	.105	.000	.982
Outcome	Q	0.70	.188	.001	.985
Output	O	0.69	.095	.004	.989

Exhibit 22 -- Stepwise Multiple Regresssion
(Stakeholders' Task 2)

Component	Measure	b	Beta	p	R2 (on entry)
Constant					
Benefit	T	1.04	.678	.000	.378
Outcome	Q	0.49	.131	.042	.632
Outcome	R	0.87	.367	.000	.826
Output	P	1.36	.227	.000	.895
Context	E	1.35	.228	.000	.925
Context	C	1.78	.292	.000	.951
Process	I	1.83	.121	.004	.962
Process	J	1.03	.100	.006	.970

APPENDIX A

INFORMATION SET USED IN THE PILOT TEST

****

ASSESSING COURSE PERFORMANCE

THE INFORMATION FRAMEWORK

****

INPUT/CONTEXT COMPONENT

Information Category: *Enrollment Equity*

Performance Indicator 1

The extent to which there was equity in enrollment of Black students in vocational education courses.

*Performance Measure **A** and Scores:*

[4] This course had the best record in its career cluster with regard to first-year enrollment of Black students (i.e., closest to the goal of 70% Black students)

[3] Between 55.0 and 64.9 percent or between 75.1 and 85.0 percent of the first-year students enrolled in this course were Black.

[2] Less than 55.0 or more than 85 percent of the first-year students enrolled in this course were Black.

[1] This course had the greatest inequity in its career cluster with regard to first-year enrollment of Black students (i.e., furthest from the goal of 70% Black students).

[0] No or insufficient data are available for this course.

Performance Indicator 2

The extent to which there was sex equity in enrollments in vocational courses.

Performance Measure B and Scores:

[4] This course had the best record in its career cluster with regard to sex equity in enrollment of first-year students (i.e., closest to the goal of 50% for both sexes).

[3] This course was above the median for courses in its career cluster with regard to sex equity in enrollment of first-year students (i.e., more than 1/2 of the courses were further from the goal of 50% for both sexes).

[2] This course was at or below the median for courses in its career cluster with regard to sex equity in enrollment of first-year students (i.e., 1/2 or more of the courses were closer to the goal of 50% for both sexes).

[1] This course had the greatest inequity in its career cluster with regard to sex equity for enrollment of first-year students (i.e., furthest from the goal of 50% for both sexes).

[0] No or insufficient data are available for this course.

Information Category: *Access to Courses*

Performance Indicator 3:

The extent to which students are able to enroll in a vocational course of their choice.

Performance Measure C and Scores:

[4] This vocational education course was one of the three having the highest percent of students able to enroll in a course that was their first choice.

[3] Compared with other vocational courses, this course ranked above the median with regard to percent of students able to enroll in a course that was their first choice.

[2] Compared with other vocational courses, this course ranked at or below the median with regard to percent of students able to enroll in a course that was their first choice.

[1] This vocational course was one of the three having the lowest percent of students able to enroll in a course that was their first choice.

[0] No or insufficient data are available for this course.

Performance Indicator 4:

The extent of opening enrollment to first year course capacity.

Performance Measure D and Scores:

[4] This vocational education course was one of the three with the highest percent of opening enrollment to first year course capacity.

[3] Compared with other vocational courses, this course ranked above the median with regard to percent of opening enrollment to first year course capacity.

[2] Compared with other vocational courses, this course ranked at or below the median with regard to percent of opening enrollment to first year course capacity.

[1] This vocational course was one of the three with the lowest percent of opening enrollment to first year course capacity.

[0] No or insufficient data are available for this course.

Performance Indicator 5:

The extent of enrollees returning for a second year of instruction.

Performance Measure E and Scores:

[4] This vocational education course ranked one of the three having the highest percent of first-year students returning to the course for a second year of instruction.

[3] Compared with other vocational courses, this course ranked above the median with regard to percent of first-year students returning to the course for a second year of instruction.

[2] Compared with other vocational courses, this course ranked at or below the median with regard to percent of first-year students returning to the course for a second year of instruction.

[1] This vocational course ranked one of the three having the lowest percent of first-year students returning to the course for a second year of instruction.

[0] No or insufficient data are available for this course.

PROCESS COMPONENT

Information Category: *Course Costs*

Performance Indicator 6:

Relative costs associated with operating vocational courses.

Performance Measure F and Scores:

[4] Compared with the other vocational courses in its career cluster, this course had the lowest per-student operating cost before reimbursement.

[3] Compared with the other vocational courses in its career cluster, this course ranked below the median with regard to per-student operating cost before reimbursement.

[2] Compared with the other vocational courses in its career cluster, this course ranked at or above the median with regard to per-student operating cost before reimbursement.

[1] Compared with the other vocational courses in its career cluster,this vocational course had the highest per-student operating cost before reimbursement .

[0] No or insufficient data are available for this course.

Performance Measure G and Scores:

[4] Compared with the other vocational courses in its career cluster, this course had the lowest cost per graduate.

[3] Compared with the other vocational courses in its career cluster, this course ranked below the median with regard to cost per graduate.

[2] Compared with the other vocational courses in its career cluster, this course ranked at or above the median with regard to cost per graduate.

[1] Compared with the other vocational courses in its career cluster,this course had the highest cost per graduate.

[0] No or insufficient data are available for this course.

Information Category: *Private Sector Support*

Performance Indicator 7:

The extent to which private sector sources contributed to the operations of vocational courses [Note: Only applies to courses in magnet schools].

Performance Measure H and Scores:

[4] This is at least the second consecutive year that one or more outside agencies donated funding, equipment, supplies, instructional materials, or other forms of tangible support and at least one of these agencies participated in the course's advisory committee both this year and last year.

[3] This is the first year that one or more outside agencies donated funding, equipment, supplies, instructional materials, or other forms of tangible support and at least one of these agencies participated in the course's advisory committee this year.

[2] Outside agencies contributed to this course this year only by participating in the course's advisory committee.

[1] Outside agencies did not contribute to this course this year either by contributing tangible forms of support or by participating in the course's advisory committee.

[0] No or insufficient data are available for this course.

Performance Indicator 8:

The extent of female and minority participation on course advisory committees [Note: Only applies to courses in magnet schools].

Performance Measure I and Scores:

[4] The membership of the course advisory committee included both sexes as well as more than one minority member.

[3] The membership of the course advisory committee included both sexes and one of these persons is a Black.

[2] The membership of the course advisory committee did not include both sexes but at least one member was Black.

[1] The membership of the course advisory committee were all members of the same sex and non of them were Black.

[0] There was no active advisory committee or no or insufficient data are available for this course.

Information Category: *Secondary-Postsecondary Articulation*

Performance Indicator 9:

The extent of secondary-postsecondary articulation for course credit.

Performance Measure J and Scores:

[4] A written articulation agreement exists enabling course graduates to receive advanced standing or course credit at a postsecondary institution.

[3] Efforts were ongoing to obtain a written articulation agreement with a postsecondary institution that would enable course graduates to receive advanced standing or course credit

[2] There was written evidence that school staff are planning to initiate efforts to obtain an articulation agreement with a postsecondary institution that would enable course graduates to receive advanced standing or course credit.

[1] There was no written evidence that school staff were planning to initiate efforts to obtain an articulation agreement with a postsecondary institution.

[0] No or insufficient data are available for this course.

Information Category: *Professional Development*

Performance Indicator 10:

The extent of instructors' participation in professional development experiences.

*Performance Measure **K** and Scores:*

[4] At least one instructor for this vocational course participated in more than one formal professional development experience this year.

[3] At least one instructor for this vocational course participated in one formal professional development experience this year.

[2] None of the instructors for this vocational course participated in a formal professional development experience this year. However, at least one instructor currently assigned to this vocational course did so last year.

[1] None of the instructors for this vocational course participated in a formal professional development experience this year or last year.

[0] No or insufficient data are available for this course.

Information Category: *Instructional Design*

Performance Indicator: 11:

The extent to which vocational course curricula are competency based.

Performance Measure L and Scores:

[4] The vocational course curriculum offered this year was considered by its division supervisor to be fully competency based.

[3] The vocational course curriculum offered this year was considered by its division supervisor to be partly competency based. Activities are underway to make the curriculum fully competency based.

[2] The vocational course curriculum offered this year was considered by its division supervisor to be partly competency based. Activities were not underway to make the curriculum fully competency based.

[1] The vocational curriculum offered this year was considered by its division supervisor as not being even partly competency based.

[0] No or insufficient data are available for this course.

Performance Indicator 12:

The extent to which vocational courses include the use of computer software in the instructional process.

*Performance Measure **M** and Scores:*

[4] This was at least the second consecutive year that students in this vocational course used computer software to teach employment and/or employability skills.

[3] This was the first year that students in this vocational course used computer software to teach employment and/or employability skills.

[2] This vocational course did not include the use of computer software to teach employment and/or employability skills this school year; however, there is written evidence that such instruction will be included next school year.

[1] This vocational course did not include the use computer software to teach employment and/or employability skills this school year and there is no written evidence that there are plans to do so next school year.

[0] No or insufficient data are available for this course.

Information Category: *Student Organization Participation*

Performance Indicator 13:

The extent of participation of students in vocational education student organizations.

*Performance Measure **N** and Scores:*

[4] Compared with the other vocational courses in its career cluster, this course had the highest percent of student participation in a vocational education student organization.

[3] Compared with the other vocational courses in its career cluster, this course ranked above the median with regard to the percent of student participation in a vocational education student organization.

[2] Compared with the other vocational courses in its career cluster, this course ranked at or below the median with regard to the percent of student participation in a vocational education student organization.

[1] Compared with the other vocational courses in its career cluster, this course had the lowest percent of its students participate in a vocational education student organization.

[0] No or insufficient data are available for this course.

OUTPUT COMPONENT

Information Category: *Course Attrition/Completion*

Performance Indicator 14:

The extent of student dropout from vocational education courses.

Performance Measure O and Scores:

[4] This vocational education course was one of the three having the lowest percent of dropouts this year.

[3] Compared with other vocational courses, this course ranked below the median with regard to percent of dropouts this year.

[2] Compared with other vocational courses, this course ranked at or above the median with regard to percent of dropouts this year.

[1] This vocational course was one of the three having the highest percent of dropouts this year.

[0] No or insufficient data are available for this course.

Performance Indicator 15:

The extent of graduates to course capacity

Performance Measure P and Scores:

[4] This vocational education course was one of the three having the highest percent of graduates to course capacity.

[3] Compared with other vocational courses, this course ranked above the median with regard to percent of graduates to course capacity.

[2] Compared with other vocational courses, this course ranked at or below the median with regard to percent of graduates to course capacity.

[1] This vocational course was one of the three having the lowest percent of graduates to course capacity.

[0] No or insufficient data are available for this course.

OUTCOME COMPONENT

Information Category: *Job Placement*

Performance Indicator 16:

The extent of training-related job placement assistance to students.

Performance Measure Q and Scores:

[4] This vocational education course was one of the three with the highest percent of students placed in training-related jobs with help from school district staff.

[3] This vocational course ranked above the median with regard to students placed in training-related jobs with help from school district staff.

[2] This vocational course ranked at or below the median with regard to students placed in training-related jobs with help from school district staff.

[1] This vocational course was one of the three with the lowest percent of students placed in training-related jobs with help from school district staff.

[0] No or insufficient data are available for this course.

Performance Indicator 17:

The extent to which course graduates are either working in training-related jobs, are in the military, or are pursuing further education.

Performance Measure R and Scores:

[4] This vocational education course was one of the three with the highest percent of students currently in training-related jobs, in the military, or pursuing further education.

[3] This vocational course ranked above the median with regard to the percent of students currently in training-related jobs, in the military, or pursuing further education.

[2] This vocational course ranked at or below the median with regard to the percent of students currently in training-related jobs, in the military, or pursuing further education.

[1] This vocational course was one of the three with the lowest percent of students currently in training-related jobs, in the military, or pursuing further education.

[0] No or insufficient data are available for this course.

Information Category: Licensing/certification

Performance Indicator 18:

The extent of licensing/certification of course graduates [when applicable].

Performance Measure S and Scores:

[4] Compared with the other vocational courses in its career cluster, this vocational education course had the highest percent of its graduates obtain a formal license or professional certificate.

[3] Compared with the other vocational courses in its career cluster, this vocational education course ranked above the median with regard to the percent of graduates obtaining a formal license or professional certification.

[2] Compared with the other vocational courses in its career cluster, this vocational education course ranked below the median with regard to the percent of graduates obtaining a formal license or professional certification.

[1] Compared with the other vocational courses in its career cluster, this vocational education course had the lowest percent of graduates obtain a formal license or professional certification.

[0] No or insufficient data are available for this course.

BENEFITS COMPONENT

Information Category: Entry Wages

Performance Indicator 19:

The extent of entry-level wages of course graduates obtaining training-related jobs.

Performance Measure T and Scores:

[4] Compared with the other vocational courses in its career cluster, graduates from this vocational education course working in training-related jobs obtained the highest [median] entry level wages from their employers.

[3] Compared with the other vocational courses in its career cluster, graduates from this vocational education course working in training-related jobs ranked above the median for [median] entry level wages from their employers.

[2] Compared with the other vocational courses in its career cluster, graduates from this vocational education course working in training-related jobs ranked below the median for [median] entry level wages from their employers.

[1] Compared with the other vocational courses in its career cluster, graduates from this vocational education course working in training-related jobs obtained the lowest [median] entry level wages from their employers.

[0] No or insufficient data are available for this course.

APPENDIX B

REVISED INFORMATION SET

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THE INFORMATION FRAMEWORK

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INPUT/CONTEXT COMPONENT

Information Category: *Enrollment Equity*

Performance Indicator 1

The extent that there is equity in enrollment of Black students in vocational education courses

Performance Measure A

The percent deviation from the district's goal that Black students represent seventy percent of each vocational course's first-year opening enrollment.[1]

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course ranks among the three deviating least from the district's goal for Black student enrollment.

[3] This course ranks above the median for deviating least from the district's goal for Black student enrollment.[a]

[2] This course ranks at or below the median for deviating least from the district's goal Black student enrollment.

[1] This course ranks among the three deviating most from the district's goal for Black student enrollment.[b]

[0] Performance data are not available.

[1] The district's goal is the current racial balance of school enrollment (i.e., seventy percent Black). Vocational courses should be ranked according to their deviation from seventy percent. The seventy percent figure needs to be reviewed periodically and adjusted as necessary.

[a] In this and similar statements the phrase "above the median" does not include the top ranked courses in [4].

[b] In this and similar statements the phrase "below the median" does not include the bottem ranked courses in [1]

Performance Indicator 2

The extent of sex equity in enrollments in vocational courses

Performance Measure B

The percent deviation from the goal that female students represent fifty percent of each vocational course's first-year opening enrollment.[2]

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course ranks first in its career cluster for least deviation from the goal for female student enrollment.

[3] This course ranks above the median in its career cluster for least deviation from the goal for female student enrollment.

[2] This course ranks at or below the median in its career cluster for least deviation from the goal for female student enrollment.

[1] This course ranks last in its career cluster for least deviation from the goal for female first-year opening enrollment.

[0] Performance data are not available.

[2]Vocational courses should be ranked according to the district's goal for female enrollment in vocational courses (e.g., fifty percent). The fifty percent figure needs to be reviewed periodically and adjusted as necessary.

Information Category: Course Popularity

Performance Indicator 3:

The extent that students enroll in a vocational course of their choice

Performance Measure C

The percent of first-year students in a vocational course selecting it as their first choice

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course is among the three with the greatest percent of first-year students selecting it as their first choice.

[3] This course ranks above the median for the percent of first-year students selecting it as their first choice.

[2] This course ranks at or below the median for the percent of first-year students selecting it as their first choice.

[1] This course is among the three with the smallest percent of first-year students selecting it as their first choice.

[0] Performance data are not available.

Performance Indicator 4:

The extent that vocational courses make use of training capacity

Performance Measure D

The percentage that results from dividing enrollment of first-year students by enrollment capacity.

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course ranks among the three with the greatest percentage resulting from dividing enrollment of first-year students by enrollment capacity.

[3] This course ranks above the median for the percentage resulting from dividing enrollment of first-year students by enrollment capacity.

[2] This course ranks at or below the median for the percentage resulting from dividing enrollment of first-year students by enrollment capacity.

[1] This course ranks among the three with the smallest percentage resulting from dividing enrollment of first-year students by enrollment capacity.

[0] Performance data are not available.

Performance Indicator 5:

The extent that first-year vocational students return to the same course for a second year of instruction

Performance Measure E

The percent of first-year vocational students who return to the same course for a second year of instruction

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course ranks among the three with the greatest percent of first-year students who return to the same course for a second year of instruction.

[3] This course ranks above the median for greatest percent of first-year students who return to the same course for a second year of instruction.

[2] This course ranks at or below the median for greatest percent of first-year students who return to the same course for a second year of instruction.

[1] This course ranks among the three with the smallest percent of first-year students who return to the same course for a second year of instruction.

[0] Performance data are not available.

PROCESS COMPONENT

Information Category: *Course Costs*

Performance Indicator 6:

Costs associated with operating vocational courses

Performance Measure F

The per-student operating costs for vocational courses[3]

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course has the lowest per-student operating cost in its career cluster.

[3] This course has a per-student operating cost that is at or below the median in its career cluster.

[2] This course has a per-student operating cost that is above the median in its career cluster.

[1] This course has the highest per-student operating cost in its career cluster.

[0] Performance data are not available.

[3]The calculation of per-student operating cost does not include state reimbursement.

Performance Measure G

The per-completer operating costs for vocational courses[4]

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course has the lowest per-completer operating cost in its career cluster..

[3] This course ranks above the median in its career cluster for per-completer operating costs.

[2] This course ranks at or below the median in its career cluster for per-completer operating cost.

[1] This course has the highest per-completer operating cost in its career cluster.

[0] Performance data are not available.

[4]The calculation of operating cost per completer does not include state reimbursement.

Information Category: Private Sector Support

Performance Indicator 7:

The extent that private sector sources contribute to the operations of vocational courses

Performance Measure H

The presence of tangible support (e.g., funding, equipment, personnel) by private sector sources

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] More than one private sector source gave tangible support to this course this year and last year.

[3] Only one private sector source gave tangible support to this course this year and last year.

[2] Only one private sector source gave tangible support to this course this year. Their was no tangible support given by any private sector source last year.

[1] No private sector source gave tangible support to this course this year or last year.

[0] Performance data are not available.

Performance Indicator 8:

The extent of female and minority participation on vocational course advisory committees

Performance Measure I

The number of persons from each sex and the number of minority persons represented on vocational course advisory committees

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] The membership of the course advisory committee includes both males and females. Two or more members are minority persons.

[3] The membership of the course advisory committee includes both males and females. Only one member is a minority person.

[2] The membership of the course advisory committee includes only males or only females. Two or more members are minority persons.

[1] The membership of the course advisory committee includes only males or only females. Only one of them is a minority person.

[0] The membership of the course advisory committee includes only males or only females. None of them is a minority person. The committee is not active or performance data are not available.

Information Category: Postsecondary Credit

Performance Indicator 9:

The presence of an articulation agreement with a postsecondary institution enabling students to obtain credit for completed course work

Performance Measure J

The extent to which an articulation agreement is in force or is in the works

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] An articulation agreement is in force for course completers to receive postsecondary institution credit for course work already completed.

[3] An articulation agreement will be in force next school year for course completers to receive postsecondary institution credit for course work already completed.

[2] An articulation agreement is in the works but will not be in force during the next school year. When it is in force, course completers will be able to get postsecondary institution credit for course work already completed.

[1] There are no efforts in the works for an articulation agreement for completers to receive postsecondary institution credit for course work already completed.

[0] Performance data are not available.

Information Category: *Professional Development*

Performance Indicator 10:

The extent that instructors participate in professional development activities

Performance Measure K

Whether vocational instructors participated in professional development activities this year and last year

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] At least one instructor for this course participated in more than one formal professional development activity this year.

[3] At least one instructor for this course participated in a formal professional development activity this year. None of the instructors for this course participated in more than one.

[2] None of the instructors for this course participated in any formal professional development activities this year. At least one of them did so last year.

[1] None of the instructors for this course participated in a formal professional development activity this year or last year.

[0] Performance data are not available.

Information Category: *Instructional Design*

Performance Indicator 11:

The extent that the vocational course curriculum is competency based according to state department of education standards

Performance Measure L

Competency-based vocational curriculum is in force or is in the works

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course has a competency-based curriculum that meets state department of education standards.

[3] The course curriculum is partly competency based according to its division supervisor. Curriculum development activities are currently in progress to meet state competency-based standards.

[2] The course curriculum is partly competency based according to its division supervisor. No curriculum development activities are currently in progress to meet state competency-based standards.

[1] The course curriculum is not competency based according to its division supervisor. No curriculum development activities are currently in progress to meet state competency-based standards.

[0] Performance data are not available.

Performance Indicator 12:

The extent that vocational courses use computer software for skill enhancement and remedial education

Performance Measure M

The number of years that vocational courses use computer software for skill enhancement and remedial education

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] Students in this course used computer software for skill enhancement or remedial education this year and last year.

[3] Students in this course used computer software for skill enhancement or remedial education this year but not last year.

[2] Students in this course did not use computer software for skill enhancement or remedial education this year. There is evidence that they will do so next year.

[1] Students in this course did not use computer software for skill enhancement or remedial education this year. There are no plans to have them do so next year.

[0] Performance data are not available.

Information Category: Student Organization Participation

Performance Indicator 13:

The extent of participation of students in vocational education student organizations

Performance Measure N

The percent of students in each vocational course participating in a vocational education student organization

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course ranks first in its career cluster for greatest percent of students participating in a vocational education student organization.

[3] This course ranks above the median in its career cluster for greatest percent of students participating in a vocational education student organization.

[2] This course ranks at or below the median in its career cluster for greatest percent of students participating in a vocational education student organization.

[1] This course ranks last in its career cluster for greatest percent of students participating in a vocational education student organization.

[0] Performance data are not available.

OUTPUT COMPONENT

Information Category: *Course Attrition/Completion*

Performance Indicator 14:

The extent of student attrition from vocational education vocational courses

Performance Measure O:

The percent of students dropping out from vocational courses during the school year[5]

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course ranks among the three with the greatest percent of dropouts during the school year.

[3] This course ranks below the median for greatest percent of dropouts during the school year.

[2] This course ranks at or above the median for greatest percent of dropouts during the school year.

[1] This course ranks among the three with the smallest percent of dropouts during the school year.

[0] Performance data are not available.

[5]Use the following formula to obtain the dropout percentage: the number of students who leave the course during the school year divided by the total number of persons enrolled in the course at the beginning of the school year.

Performance Indicator 15:

The extent that students complete their vocational instruction.

Performance Measure P:

The percent that results from dividing the number of course completers by first-year course capacity

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course ranks among the three with the greatest percent that results from dividing the number of course completers by first-year course capacity.

[3] This course ranks above the median for greatest that results from dividing the number of course completers by first-year course capacity.

[2] This course ranks at or below the median for greatest percent that results from dividing the number of course completers by first-year course capacity.

[1] This course is among the three with the smallest percent that results from dividing the number of course completers by first-year course capacity.

[0] Performance data are not available.

OUTCOME COMPONENT

Information Category: ***Job and education Status of Completers***

Performance Indicator 16:

The extent of training-related job placement assistance to completers

Performance Measure Q:

The percent of completers stating that school staff placed them in training-related jobs

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course ranks among the three with the greatest percent for completers stating that school staff placed them in training-related jobs.

[3] This course ranks above the median for greatest percent for completers stating that school staff placed them in training-related jobs

[2] This course ranks at or below the median for greatest percent for completers stating that school staff placed them in training-related jobs

[1] This course ranks among the three with the smallest percent for completers stating that school staff placed them in training-related jobs

[0] Performance data are not available.

Performance Indicator 17:

The extent that vocational course completers succeed in finding jobs or furthering their education

Performance Measure R:

The percent of vocational course completers currently in training-related jobs, in the military, or pursuing further education

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course ranks among the three with the greatest percent of course completers either currently in training-related jobs, in the military, or pursuing further education.

[3] This course ranks above the median for greatest percent of course completers either currently in training-related jobs, in the military, or pursuing further education.

[2] This course ranks at or below the median for greatest percent of course completers either currently in training-related jobs, in the military, or pursuing further education.

[1] This course ranks among the three with the smallest percent of course completers either currently in training-related jobs, in the military, or pursuing further education.

[0] Performance data are not available.

Information Category: *Professional Recognition* [6]

Performance Indicator 18:

The extent that vocational course completers get licensing or certification

Performance Measure S:

The percent of vocational course completers who get licensed or certified

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course ranks first in its career cluster for greatest percent of completers who get licensed or certified by a professional board.

[3] This course ranks above the median in its career cluster for greatest percent of completers who get licensed or certified by a professional board.

[2] This course ranks at or below the median in its career cluster for greatest percent of completers who get licensed or certified by a professional board.

[1] This course ranks last in its career cluster for percent of completers who get licensed or certified by a professional board.

[0] Performance data are not available.

[6] Use this performance measure indicator and outcomes only when comparing courses where licensing and certification are applicable.

BENEFITS COMPONENT

Information Category: *Wages*

Performance Indicator 19:

Entry-level wages of vocational course completers

Performance Measure T:

The median entry-level wages earned by vocational course completers getting training-related jobs

Performance Measure Outcomes and Scores (where [4] is best performance)

[4] This course ranks first in its career cluster for highest median entry-level wage earned by completers getting training-related jobs.

[3] This course ranks above the median in its career cluster for highest median entry-level wage earned by completers getting training-related jobs.

[2] This course ranks at or below the median in its career cluster for highest median entry-level wage earned by completers getting training-related jobs.

[1] This course ranks last in its career cluster for highest median entry-level wage earned by completers getting training-related jobs.

[0] Performance data are not available.